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CONSERVATIVE KIDNEY SURGERY

WITH PARTICULAR REFERENCE TO RESECTION*

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CLEVELAND

BEFORE surgical diagnosis had reached its present state, the surgical dictum was: In case of doubt, explore. That dictum is still more commonly applied in general than in specialized surgery. I can well recall the time when kidneys were explored, or bisected and often the findings at operation were more confusing than clarifying. But urological diagnosis has now reached such a degree of accuracy that it is usually a fairly simple matter to decipher a renal case. Kidney operations are therefore more carefully planned and hence are more skillfully handled. With this increased preoperative knowledge of the problems presented by pathological conditions of the kidney, we have been growing more conservative and needless removals of the kidney are becoming more rare. Furthermore, in the presence of pyelonephritis, infected hydronephrosis, ureteral obstruction and so forth, surgical intervention has been replaced either completely or in part by the use of the ureteral catheter.

The Use of the Ureteral Catheter.

Ureteral catheter drainage and ureteral dilatation are applicable and should first be tried in almost any case of renal infection. It must be remembered that some form of obstruction is the cause of renal infections in the majority of cases. Thus Caulk found an obstruction to be present in 80 per cent of a large series of cases of renal infection collected from his private practice and from the records of the St. Louis Children's Hospital and Barnes Hospital. Nephrostomy does not remove the obstruction; it merely relieves the acute renal or pelvic retention of infected urine. The use of ureteral or urethral catheters and bougies may relieve the obstruction and at the same time make it possible to eradicate the infection. In other words, in many cases of pyelitis or pyelonephritis, once drainage is established the infection may take care of itself.

Hydronephrosis. The problems presented by hydronephrosis form a very rich field for investigation. It is still quite evident that there are certain groups of cases in which we cannot determine the etiology. Recently some of the European surgeons, notably von Lichtenburg, have been making use of the fluoroscope in studying hydronephrosis. By this method they are able to observe at once whether or not there is any contraction of the pelvis. If in the case of a large hydronephrosis no contraction is observed, then drainage by a ureteral catheter is instituted. If after a few days still no contraction can be seen under the fluoroscope, nephrectomy is done.

We are particularly interested in the type of hydronephrosis that is secondary to ureteropelvic obstruction, especially that caused by the presence of

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anomalous blood vessels supplying the lower pole of the kidney. We feel that ureteral dilatation does not reduce the

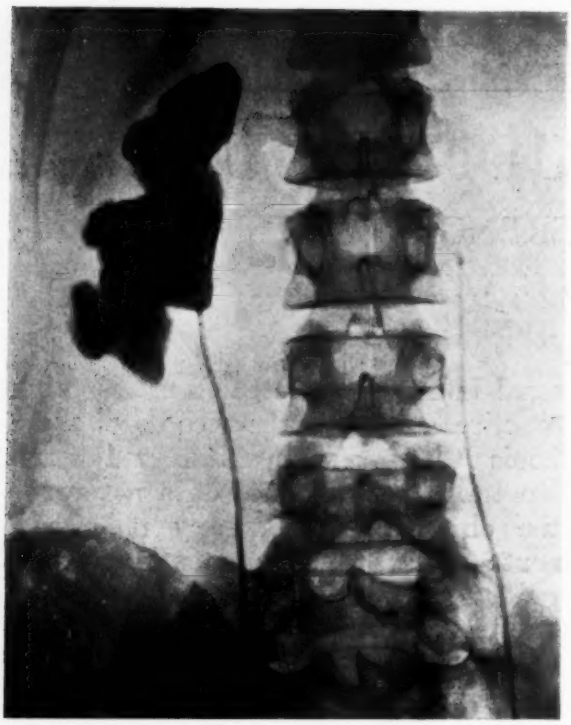


FIG. 1. Pyelogram demonstrating presence of an infected hydronephrosis (Case 1). This kidney was freed from infection by ureteral dilatation and lavage and patient was relieved of symptoms.

size but may aggravate the hydronephrosis in these cases, probably because of the irritation which is caused at the point of constriction by the ureteral catheter. We have made this observation several times.

However, many operators remove the kidney not only in these cases but also in cases in which the hydronephrosis is due to other causes, even when the hydronephrosis is only of moderate degree, for example, when the pelvic capacity is above 100 c.c. In view of their classical experimental investigation of hydronephrosis and renal counterbalance which has been made during the last few years, Hinman and his associates feel justified in performing nephrectomy in most of these cases, as they are convinced that the opposite kidney has permanently taken over a good deal of the work of the hydronephrotic kidney, that the hydronephrosis will remain the same or will increase, and that the hydronephrosis makes of the kidney in which it is present a permanently weak point in which infection may set in at any time. However, there are others (and it is to this group that we ally ourselves) who are becoming more conservative in their opinion regarding these cases. We feel that in the past few years there has been a tendency toward the hasty removal of kidneys which could have been salvaged. Unless the hydronephrosis is obviously due to pressure exerted on the ureter by an accessory blood vessel or to some other obstruction, we feel that a hasty operation upon the kidney should not be performed. In each instance a course of from five to ten ureteral dilatations at intervals of from seven to ten days is followed by the taking of a second pyelogram and a differential function test before the final decision as to nephrectomy is made.

The following case history will illustrate our attitude in regard to this type of hydronephrosis:

CASE 1. The patient, a single woman, aged thirty, consulted us in August, 1925, because of pain in the right side, headache, nausea, and vomiting.

The findings in the physical examination cast suspicion upon the right kidney, especially as the appendix had been removed. A urological investigation demonstrated the presence of an infected hydronephrosis in the right kidney (Fig. 1). The function of this kidney was only two-fifths of normal while the function of the other kidney was equal to about 1⅔ times that of a normal kidney.

Ureteral dilatation and kidney lavage removed the infection and reduced the retention. When last heard from, almost three years later, the patient seemed to be quite well.

An examination of the pyelogram might suggest as an argument for more radical treatment that this kidney has received rather severe damage, which is probably for the most part permanent. Against this argument is the fact that the patient is a young, unmarried woman and her kidney power should be carefully preserved for her probable future obligations.

We feel, therefore, that if the infection can be eradicated and the patient's symptoms relieved, a moderate hydronephrotic blessing should anything happen to the other kidney. Hinman has shown that a kidney in which hydronephrosis has been

A B

Fig. 2. Injected specimen showing accessory artery supplying lower pole of kidney and obstructing ureter at ureteropelvic junction. A. Roentgenogram of kidney after all vessels except accessory artery have been injected with bismuth subnitrate. B. Roentgenogram of kidney showing injected accessory artery, and illustrating how small an area of kidney is supplied by such an accessory vessel.

change, while anatomically pathological, is not symptomatically and clinically pathological.

It should be borne in mind, however, that we are speaking now only of hydronephroses of moderate size and that no rule of procedure applicable to all cases can be presented. Every case must be studied very carefully and individually. Our experience has shown us that a hydronephrosis of considerable size may be relieved by a plastic operation and the kidney, even though its function is lessened, may be a produced will function if the ureter of the opposite kidney is ligated.

These accessory arteries, as a rule, are rather small and at the most rarely supply more than one-fourth to one-fifth of the kidney (Fig. 2, A and B). In cases in which there is an associated renal infection which has not responded to lavage we would advise against merely ligating the vessels, since the resultant infarcted area is apt to become infected and a dangerous secondary nephrectomy may be necessary. In three of these cases in which the accessory blood

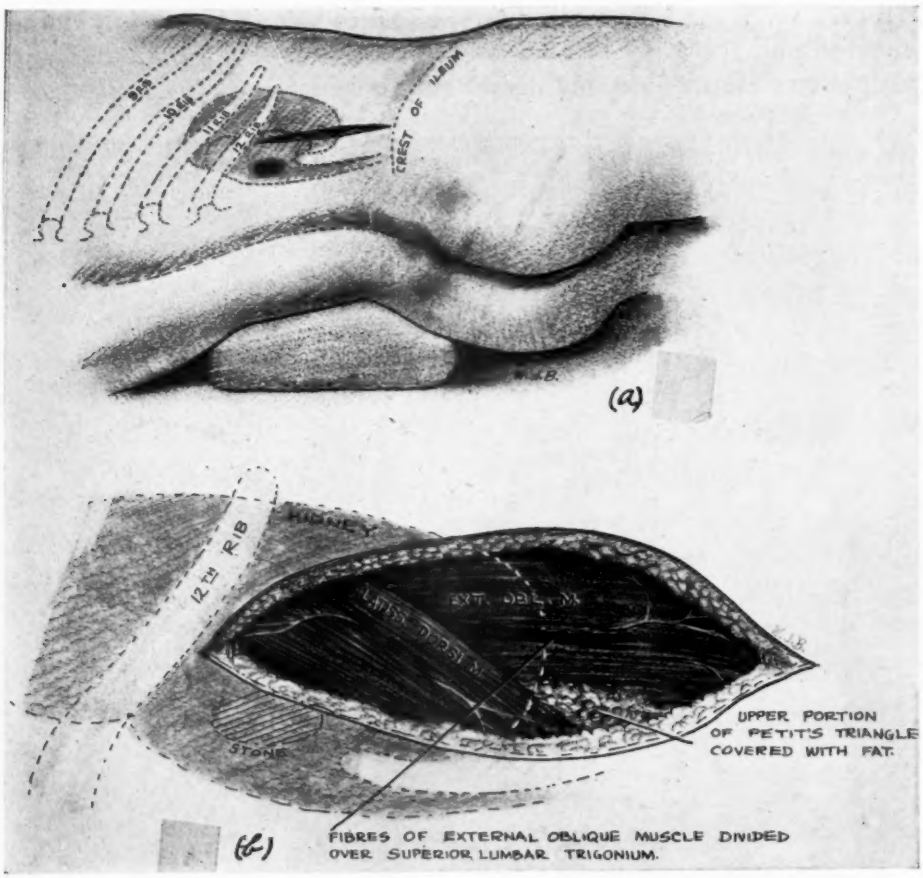


FIG. 3. Operative technique for exposure of upper ureter and pelvis of kidney. A. Relation of kidney pelvis to skin incision. B. Separation of muscles without transverse section.

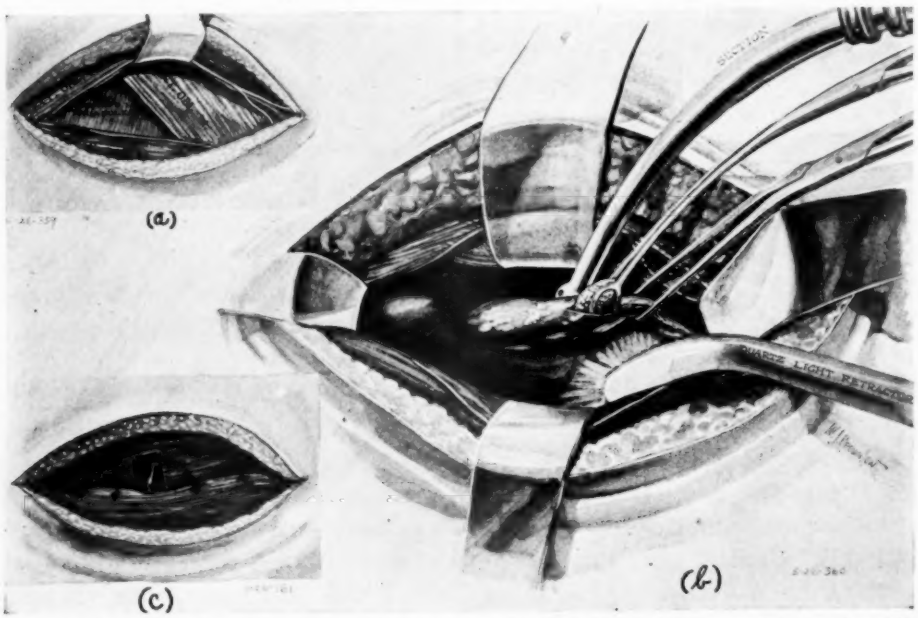


FIG. 4. Operative technique for exposure of upper ureter and pelvis of kidney. A. Retraction of nerves. B. Exposure of renal pelvis by first identifying ureter and then developing the field upward with the aid of two hooked forceps, one of which is shown. Note the quartz light retractor which is almost indispensable. C. Closure of muscles.

vessels to the lower pole were divided and ligated, the patients have reported recently that they have been feeling perfectly well

Fig. 5. Operative technique for exposure of upper ureter and pelvis of kidney. Appearance of scar.

ever since their operations; nineteen, sixteen and eight years ago respectively.

Nephrotomy and Pyelotomy. Everyone now avoids a nephrotomy if the situation can be handled by a pyelotomy. The experimental work of Magoun, Barnes, Corbett and Carson shows very clearly the disadvantages of nephrotomy, Magoun having shown that the reduction in the function of the kidney is directly proportional to the amount of tissue destruction caused by the operation. In a series of cases recently collected from the literature, Rosenow found 1767 nephrotomies with a combined mortality of 5.8 per cent, and 950 pyelotomies with a mortality rate of 0.7 per cent.

In trying to remove a large stone through an ordinary pyelotomy incision or even through the large pyelotomy incision of Eisendrath, the ureter may accidentally be torn loose from its attachment to the renal pelvis. This has happened once in our own experience and has been reported a number of times by others. In each instance, however, anastomosis was followed by an uneventful recovery. We do not mean to infer that this accident is of no moment, but merely wish to call attention to the fact that while it is probably the worst accident that could occur in the course of a pyelotomy for calculus, in no instance has it caused any serious after effects. This could by no means be said of the complications of nephrotomy.

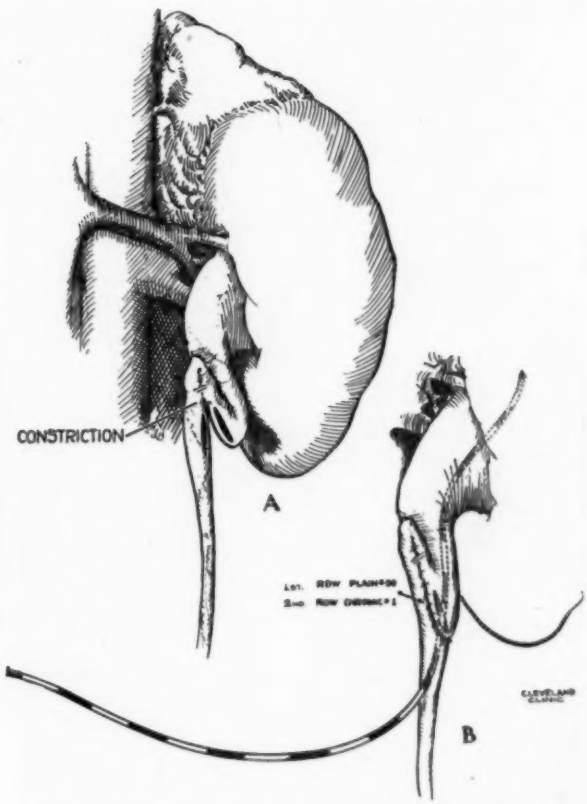


Fig. 6. Plastic operation on ureter. A. Incision in ureter for uretero-ureterostomy in case of hydronephrosis due to ureteropelvic obstruction (stricture and kink). B. Anastomosis. Inner row of interrupted plain No. 00 catgut sutures; outer row of interrupted chromic No. 1 catgut sutures. Note insertion of ureteral catheter into renal pelvis through incision in ureter below anastomosis. This ureter was anchored to back muscles and left in place for two days.

The argument most often advanced against nephrotomy is that it causes postoperative hemorrhage. However, it is interesting to note in the results given by

Caulk in a report made in 1921 that the deaths in his nephrotomy cases were attributed to another factor. The series

Fig. 7a.

included 43 nephrotomies and the mortality of this type of operation was 9.3 per cent. He lost but one of the remaining 220 cases in the series, a mortality of only 0.4 per cent for all the other types of renal operations. This, we feel, proves that it is the infection which occurs in such cases, superimposed upon the damage which has been done to the renal cortical tissues by the nephrotomy, which is the most important factor in producing the high mortality. Furthermore, hemorrhage can be treated easily by transfusion, while disseminated infection is often irremediable.

An attempt should be made in all purulent cases to reduce the infection as much as possible before operating, especially if a nephrotomy is to be done later. In some cases an infected kidney may be satisfactorily drained by pyelostomy, for

Fig. 7b.

Fig. 7. Enormous hydronephrotic sac removed through incision shown in Figures 3 and 4. a. Pyelogram. b. Injected specimen—capacity about 800 c.c.

example, in a case in which there is a large infected hydronephrosis and little renal tissue is left, and a secondary nephrectomy is to be performed. This is also true in cases in which there is a moderately good renal function and the emergency operation is precipitated by ureteral obstruction rather than by extensive infection in the renal cortex.

The old longitudinal splitting of the

kidney along Brödel's line is now very seldom done, the surgeon preferring to effect the same result if possible, by partial radial nephrotomy.

METHOD OF SURGICAL PROCEDURE

Conservatism in renal surgery is not confined to the choice of operation; it includes equally the method of surgical procedure. We still do not believe in delivering the kidney through the wound, "manhandling" it by tearing it loose from its well-developed fascial and fatty bed and thereby probably causing a temporary embarrassment of its complex function, just to remove a calculus from the pelvis. In most instances it is possible successfully and safely to carry the operation to the kidney. We will admit, however, that this does not make it easier for the surgeon, and we will admit also that occasionally, for instance, when the stone lies in the tip of a long calix or in the case of a "short-coupled" patient, delivery of the kidney may be necessary. But even in these instances it is probably better, if the size of the stone permits, to do a nephrotomy without delivering the kidney.

When the shadow of the stone in the roentgenogram is below the level of the twelfth rib, it is generally possible to remove it through the old straight posterior incision of Edebohl, making use of Petit's triangle. This permits a good exposure of the pelvis and upper ureter (Figs. 3, 4, and 5). Practically no muscle is cut and the patient is out of bed from three to seven days sooner than after an operation in which the usual incision is used. We have also performed plastic operations on the renal pelvis through this incision (Figs. 6 and 7) and we once used this incision for the removal of an enormous hydronephrotic sac (about 800 c.c.) (Fig. 5, A and B). Furthermore, if it is found to be inadequate, this incision can be enlarged anteriorly and thus transformed into the usual kidney exposure.

In performing a nephrectomy, it is often possible by this technique to ligate the renal pedicle before freeing and delivering the kidney. This, we feel, may be quite worth while for the patient, since the trauma necessary to free a large, infected or malignant kidney may force infected material or tumor tissue (from a hypernephroma) into the renal vein and thus into the general circulation.

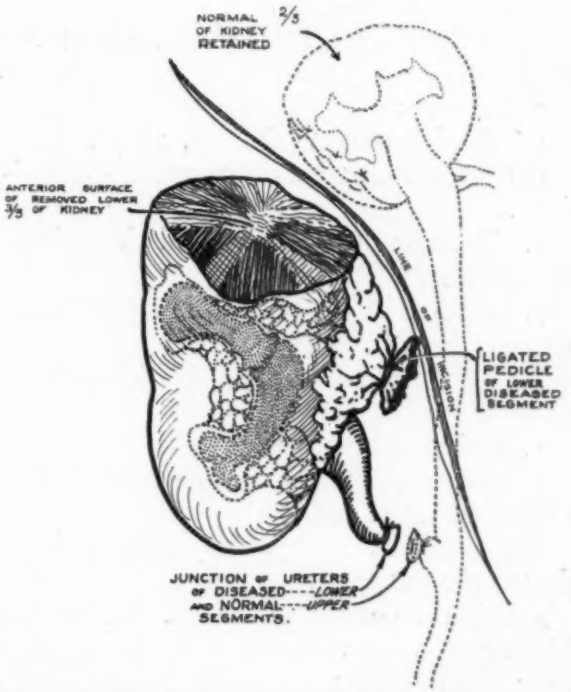

NORMAL ⅔ OF KIDNEY RETAINED
ANTERIOR SURFACE OF REMOVED LOWER ⅓ OF KIDNEY
LIGATED PEDICLE OF LOWER DISEASED SEGMENT
JUNCTION OF URETERS OF DISEASED---LOWER AND NORMAL---UPPER SEGMENTS.

Fig. 8. Operative technique employed in resection of pyelonephritic segment of a double kidney (Case IV).

RESECTION OF THE KIDNEY

The increased accuracy which urologists have attained in their diagnostic procedures is demonstrated particularly by the increasing number of reports of successful renal resection. This operation was first performed by Czerny in 1887; however, only recently have reports of cases in which this operation has been performed become more numerous. Resection of the kidney is indicated only in cases in which the disease is unquestionably localized. It has been performed under the following conditions:

On a single kidney, the other being present.

1. Localized hydronephrosis (Young, Judd, the authors).

2. Localized hydronephrosis with calculus (Young, Kümmel).

3. Ecchinococcus cys (Kümmel, Bardenheuer, Manteuffel).

4. Solitary cyst (Moynihan, 1902; the authors).

5. Tumors:

(a) Angiosarcoma (Czerny, 1887).

(b) Inflammatory myxosarcoma (Moynihan).

6. Trauma (Voelcker and Wossidlo, 1924; others).

7. Localized area of infection (Kümmel, 1893).

On a double kidney, the other kidney being present.

1. Unilateral resection:

(a) Hydronephrosis of one part (Judd, Eisendrath, the authors).

(b) Calculus and pyonephrosis (Eisendrath, the authors).

(c) Tuberculosis (Legueu). The single kidney was also removed later, leaving only the half of the double kidney which was not diseased.

2. Bilateral resection (Eisendrath, Phifer).

On a horsesboe kidney.

1. Solitary cyst (Moynihan, 1902).

2. Hemorrhagic cyst (Judd, 1927).

3. Tuberculosis (Lazarus).

4. Calculus and pyonephrosis (the authors).

On a single kidney, the other having previously been removed.

1. Calculus and pyonephrosis (Judd).

2. Cyst (Morris, quoted by Moynihan, 1902).

Partial removal of the kidney is indicated in certain cases of localized disease and occasionally in cases of traumatic injury of the kidney. A very excellent article on the subject was presented by Judd in 1927.

Resection of the kidney is the only logical treatment of solitary cysts, which usually occur at one pole or the other, as the pelves and calices are not encroached upon by such a condition. Hemorrhagic and ecchinococcus cysts have also been removed in this way. Resection has been performed in cases of localized hydronephrosis (hydrocalices) and of calculous hydronephrosis when one or two calices are involved. As others have shown, the operation is particularly applicable to such conditions when the caudal calix is the one that is diseased. When nephrolithotomy is performed in this type of case there is a tendency to the recurrence of stone or to the continuation of the infection in the stagnant urine of the hydrocalix, since drainage from a dilated, flabby caudal calix is poor.

A localized abscess or renal carbuncle might be treated by resection; however, the operator would have to be very certain concerning the boundary line between the healthy and the diseased tissue, for the line of resection must always pass through an uninfected field. Malignant and tuberculous conditions demand complete nephrectomy. Judd has tried resection in a number of cases of tuberculosis of the kidney but has always received a report of the presence of tubercle bacilli in the specimen of urine obtained from the supposedly good portion left behind.

Hughes and Banks have clearly summarized the indications for partial nephrectomy in cases of trauma by saying "(a) if a piece of the kidney remains attached to an intact ureter and renal artery, remove the detached portion and leave the rest behind; (b) sew up lacerations even though severe, if the ureter and vessels are intact; (c) if the kidney is pulpy and there has been extensive hemorrhage from the pedicle, nephrectomy is the only course." Therefore, if the patient is quite anemic and there is great danger of secondary hemorrhage or if there is a possibility that serious infection may set in, nephrectomy rather than resection of the kidney is indicated.

It has been shown that while a half of one kidney is quite sufficient to maintain life in an animal or a human being, nevertheless such a limitation in the amount of kidney tissue is a serious handicap. If it becomes necessary to remove one whole kidney and

also half of the other kidney, the complete nephrectomy should be performed first, so that the kidney to be resected can receive the benefit of compensatory hypertrophy before its diseased half is resected. We have noted the good effects of this method of procedure in experiments on animals and it has also been demonstrated by the successful outcome in the cases cited by Morris, Legueu, Judd, in

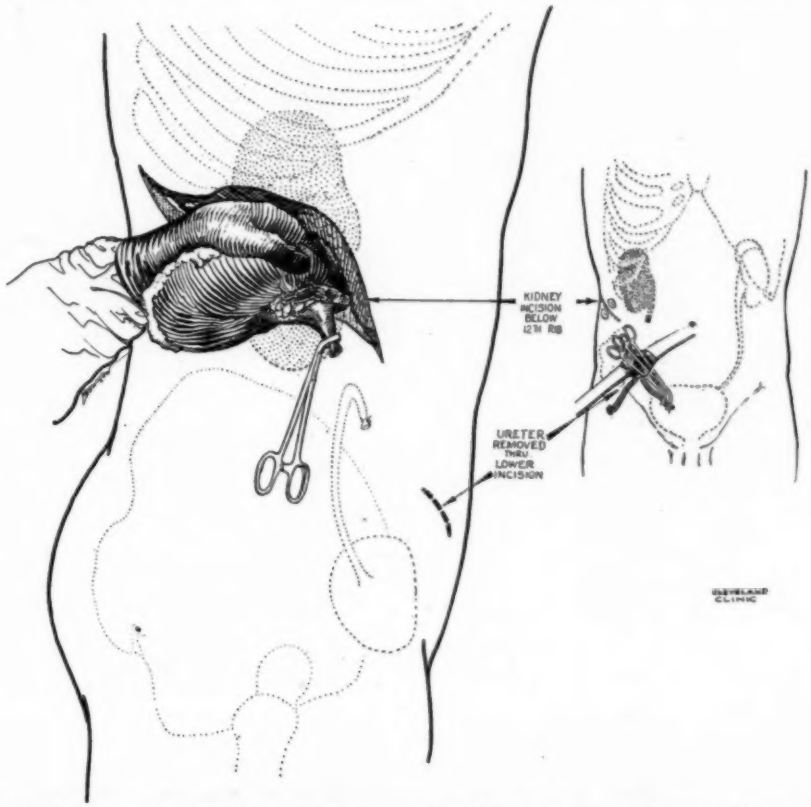


Fig. 9. Resection of kidney and complete ureterectomy. Kidney is removed through the usual lateroposterior incision; upper end of the ureter is freed and pushed down toward pelvis; through a high McBurney incision ureter is divided at bladder and removed.

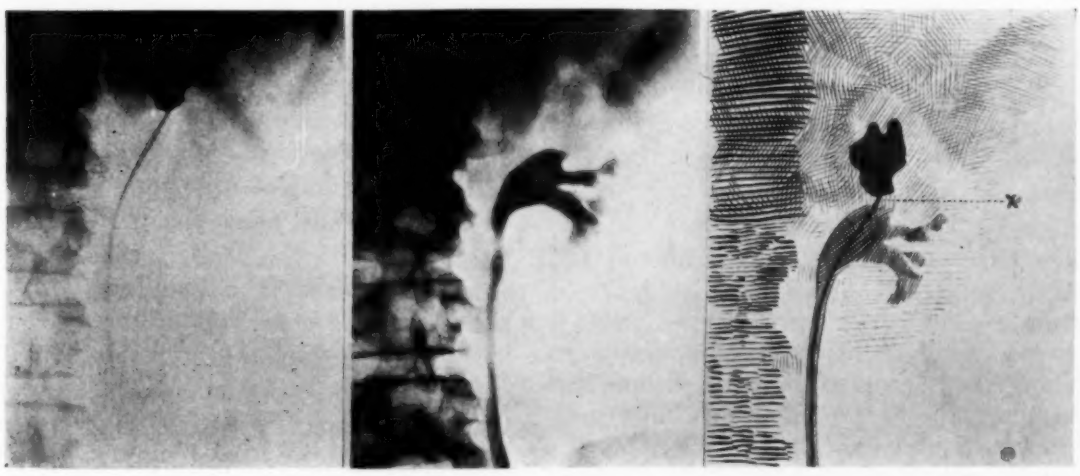


Fig. 10. Pyelograms in case of localized hydronephrosis (Case 11). A. First pyelogram showing a dilated upper calyx of left kidney due to renal infundibular stricture. B. Second pyelogram showing no solution in upper calyx but apparently normal lower calyces. C. Superimposition of (A) on (B) to show the position of the stricture (x) found at operation.

each of which this procedure was carried out.

By experiments on animals Mark has shown that kidneys that have been reduced in size by operation are similar to partially diseased kidneys in their response to diet and work. A certain number of nephrons are retained intact in the diseased kidney and also in the resected kidney. As he expresses it:

> Each time the hard-working glomeruli and tubuli are too greatly taxed, they are damaged and this leads to further atrophy. Albuminuria, hematuria, and high blood pressure, as well as hydremia and urea retention (edema and uremia), are the final results when an insufficient amount of kidney is left, either as the result of disease or of operation. If by means of a careful diet we avoid irritation of the still healthy portion of the kidney, a pronounced hypertrophy and increased function will result. In the dog this is accomplished by feeding little salt and little nitrogen, and on this diet the animals can be kept alive for a long time.

We feel that it may often happen that when the remaining portion of a single kidney shows atrophy, this in reality is due to a poor postoperative regimen rather than to an unwise surgical procedure. In other words, the salt and nitrogen intake must be limited in proportion to the response of the individual case. In each instance the integrity of the cardiovascular system as well as of the urinary tract must be kept in mind after the resection of the kidney.

In considering the problems presented by double kidneys, it is important to bear in mind the figures of Eisendrath which emphasize the value of a correct preoperative diagnosis. Eisendrath collected 80 cases of double kidneys, including two of his own, and found that in 25 per cent of the cases in which a complete nephrectomy was performed a heminephrectomy would have been sufficient if the correct diagnosis had been made preoperatively. However, in five of these cases, although hemi-

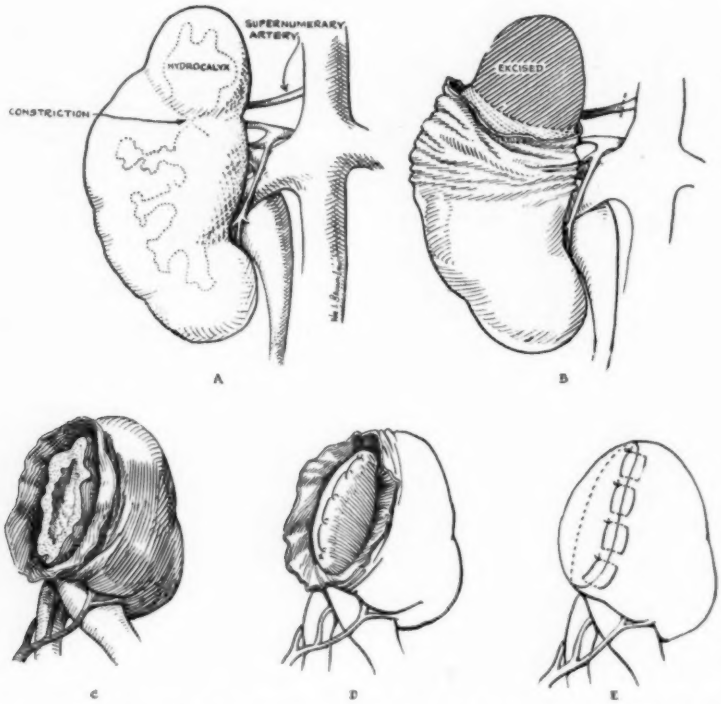


Fig. 11. Technique of heminephrectomy for hydrocalyx produced by renal infundibular stricture (Case II). A. Stricture of infundibulum and hydrocalyx. B. Reflection of true capsule. C. Remnant of kidney after excision of hydronephrotic shell of superior pole. D. Approximation of edges of kidney stump. E. Approximation of edges of capsule.

nephrectomy was indicated by the condition present, it would not have been anatomically or technically possible.

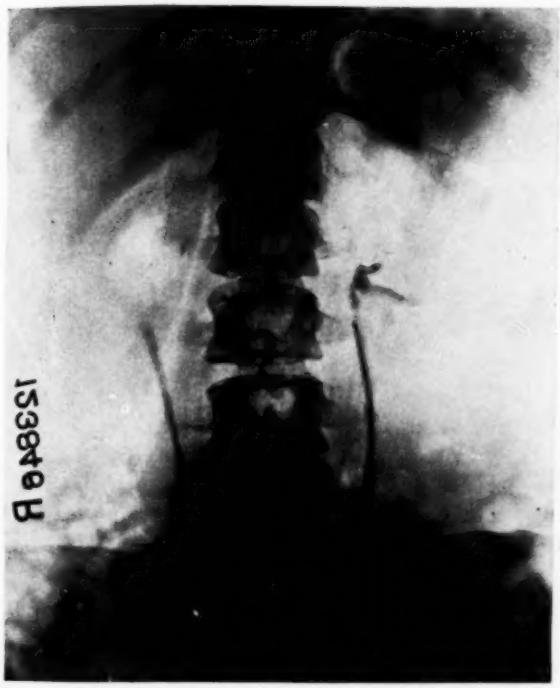


Fig. 12. Pyelogram taken five years after heminephrectomy in case of localized hydronephrosis (Case II). Pelvis purposely was not completely distended. Note absence of obstruction and thickness of renal cortex.

In 12 of these 80 cases heminephrectomy was performed and in nine the result was satisfactory, while in three a secondary complete nephrectomy was required. Infection played a leading rôle in making it necessary to perform the three secondary operations. It should be borne in mind that the surgical procedure of removing the infected half may spread the infection to the other half of the kidney. As Judd has emphasized, a resection in the presence of extensive infection is often followed by a severe reaction and the complete nephrectomy may become necessary. Moreover, it may be necessary to remove the rest of the kidney when the patient is not in so good a condition as before the primary operation.

In two of our five cases urinary fistulae developed; however, they both closed, one a few days and the other two and a half months after operation.

The final decision as to the advisability of performing a resection of the kidney can be made only at operation. The possibility of such a procedure must have been con-

Fig. 13. Plain film showing enlargement of lower pole of left kidney (Case III).

sidered and must have been verified by the preoperative study, namely, by a differential function test, urinalysis, and a pyelographic examination. Furthermore, in a case in which two kidneys are present and the diseased kidney has only a fair function and is extensively infected, resection should not be done.

TECHNIQUE OF RESECTION

As Voelcker and Wossidlo state, the technique of resection has to conform to the circumstances of the individual case. The type of kidney found, its blood supply, its condition, the total and separate kidney function, and finally, the condition of the perirenal region, each has its part in determining the course of the operation. If possible, the kidney should be delivered into the wound or it should at least be freed to a sufficient degree so that the amount of distribution of the damage can be accurately determined. In some instances perirenal adhesions may interfere with this freeing of the kidney or with the careful examination of the vascular pedicle, thereby making complete nephrectomy necessary.

Voelcker and Wossidlo feel that a diago-

nal wedge should be removed if possible. We believe that the division of all nutrient vessels should be made after the kidney

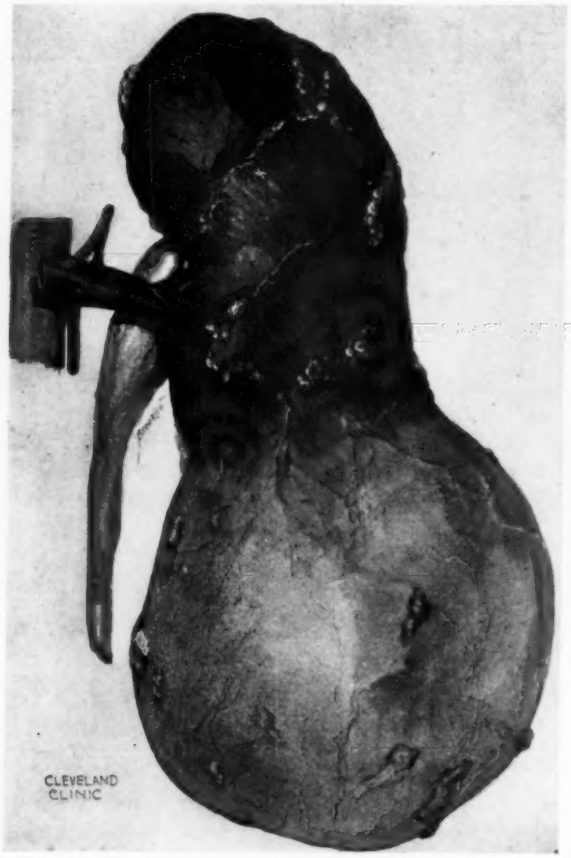


FIG. 14. Drawing showing appearance of cyst involving lower pole of left kidney as seen at operation (Case III).

substance has been divided, since in one of our cases our preoperative plan of heminephrectomy was defeated by the primary division of the vascular supply. We were dealing with a double kidney the main vein of which, while it drained the normal segment, also traversed the diseased portion and, unfortunately, was sacrificed. It is not so easy to determine the vascular supply in the presence of many adhesions as the drawings in the textbooks would lead one to believe.

During the division of the cortical substances, bleeding can be controlled by pressure on the pedicle and by deeply buried sutures. Through and through mattress sutures are used for approximation. Fat, fascia or muscle may be placed under the suture which unites the cut edges of the capsule. As the result of their

FIG. 15. Solitary cyst with small portion of renal cortex (Case III). Cyst is only partly distended. Tip of clamp overlies the resected renal tissue.

experimental study, Perlmann and Kaïris favor the use of muscle for hemostasis. They say that although it is resorbed it is replaced by firm connective tissue, which eliminates the possibility of future hemorrhage.

In cases of double kidney the ureter of the resected segment must often be totally (Fig. 8) or partially removed, as happened in one of our cases. If it is dilated and infected, it must be excised down to the point where the dilatation begins, in order to avoid a secondary postoperative empyema of the retained portion of the dilated ureter. If the ureter is double in only part of its course, it should be divided just above the point of union with the ureter of the healthy segment. If the entire ureter must be removed, it is best to make two incisions, starting the procedure either from below or above (Fig. 9).

Horseshoe Kidney. Resection of a horseshoe kidney is a more difficult task than the resection of either a single or a double

kidney. This is due, first, to the difficulty of making an accurate preoperative diagnosis, and secondly, to the fact that these

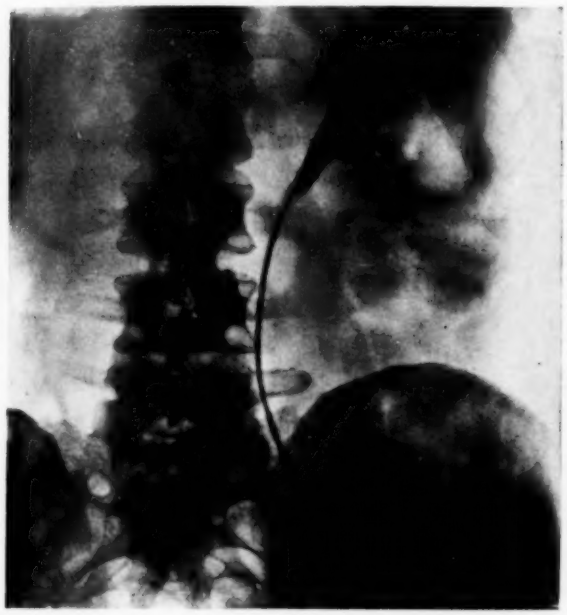


Fig. 16. Pyelogram made three years after removal of solitary cyst involving lower pole of left kidney (Case III).

kidneys are fixed and have a bizarre distribution of their blood vessels, which lie at variable levels. To a certain extent it is true that the smaller the degree of fusion of the two portions, the easier the resection. In the presence of infection a complete removal of half of the horseshoe kidney should be made rather than the removal of only a smaller portion, since as the result of the poor drainage the hydronephrosis, which is almost always present, will tend to keep up the infection.

CASE REPORTS

Resection of a Non-Anomalous Kidney, the Other Kidney Being Also Present:

Case II.* (Localized hydronephrosis). The patient, a woman aged fifty-two, consulted us in May, 1923, because of attacks of colic in the left side.

Physical examination revealed the presence of tenderness in the left kidney region and the urine showed a few white blood cells and red blood cells but the only real evidence of the presence of a pathological condition was given by the pyelogram (Fig. 10).

Fig. 17. Plain plate in case of calculous pyonephrosis in lower segment of a double kidney (Case IV). Upper arrow points to large upper pole.

Diagnosis was stricture of the infundibulum of the superior calix, with resultant hydronephrosis of the calix.

A resection of the upper portion of the kidney was performed (Fig. 11). This has relieved the colic until the present time. A pyelogram made on January 11, 1928, showed the pelvis to be slightly contracted (Fig. 12) but no infection was present. A functional test of the remaining portion of the left kidney showed six per cent excretion in fifteen minutes, the dye appearing in three minutes. The right kidney excreted 19 per cent in the same period.

We feel that in this case, in which approximately five years have elapsed since operation, the resection was justified, since the patient has been relieved of her symptoms and the function of the remaining two-thirds of the left kidney is about 80 per cent of the normal.

Case III. (Solitary cyst.) The patient, a married man aged fifty-three, consulted us on March 30, 1925, complaining of a "pulling-down" pain in the left lower abdomen and of occasional vomiting after breakfast for years. Eight to twelve years previously the pain in the left side had been worse and he had passed some sand in the urine.

*Lower, W. E. and Belcher, G. W. Renal infundibular stricture producing hydrocalyx. *J. Urol.*, 12: 121, 1924.

Physical examination revealed some tenderness in the right upper quadrant of the abdomen. Roentgenograms of the gastrointestinal tract were normal; the plain roentgenogram of the kidney showed an enlarged outline, the enlargement involving the lower pole. The pyelogram gave an apparently normal picture but only the upper part of the kidney shadow was visible. Since neither a bifurcation of the ureter nor a double ureter could be demonstrated, a preoperative diagnosis of cyst or tumor of the lower pole of the kidney was made.

Fig. 18. Pyelogram in case of calculous pyonephrosis of lower segment of a double kidney (Case iv). This film unfortunately does not include all of upper pole, the large size of which, as shown on plain plate (Fig. 17), explains unusually good function of this kidney as indicated by function test.

The operation performed on April 15, 1925, revealed a solitary cyst which together with the adjoining portion of the renal cortex, was removed from the lower pole of the kidney (Figs. 13, 14 and 15). The patient made an uneventful recovery and was discharged on the fourteenth postoperative day.

The patient, who was seen recently, has not had any return of his symptoms. The condition of the kidney was rechecked by a pyelogram (Fig. 16) which did not reveal any sign of infection. The kidney secreted normally.

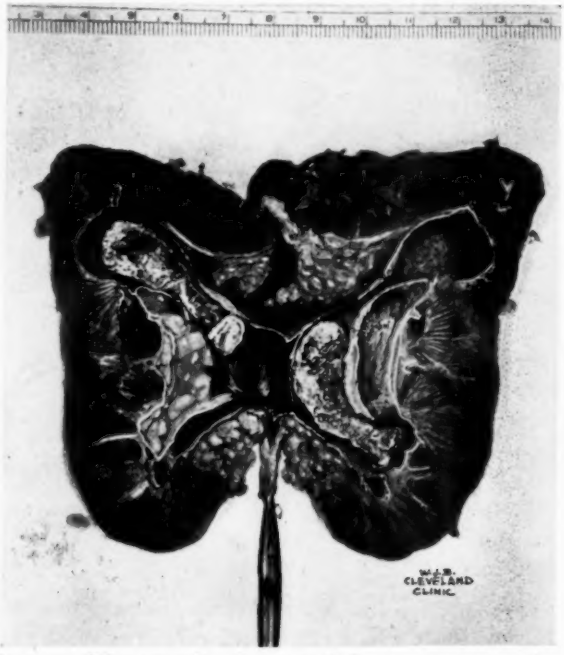


Fig. 19. Photograph of resected lower segment of a double kidney containing calculi and pus (Case iv).

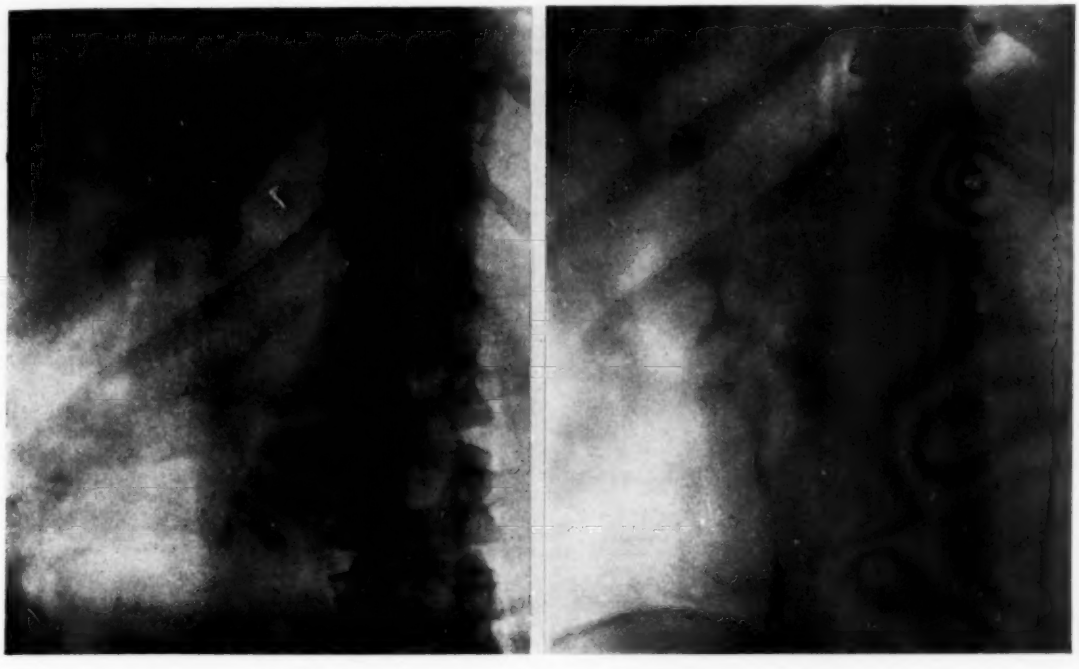
In this case any procedure other than resection would have been unjustifiable in view of the patient's condition at the present time, three years after operation.

Renal Resection of Cases of Double Kidney:

Case iv. (Calculus; pyonephrosis of lower segment of double kidney.) The patient, a man aged forty, consulted us in July, 1927, because of nausea, vomiting and pain in the right kidney region.

The general history and the physical examination cast suspicion on the gastrointestinal tract and the right kidney; however, roentgenographic studies of the gastrointestinal tract did not reveal any pathological condition. The blood Wassermann reaction was four plus. Roentgenographic studies of the urinary tract revealed a fused right kidney containing two pelves and two ureters, which united about 10 cm. below the level of the kidney. The upper pelvis was apparently normal; the lower pelvis, which comprised about two-thirds of the kidney, was pyelonephrotic and contained calculi. As the function from this kidney was unusually good, it was thought even before operation

that it might be possible to perform a partial nephrectomy (Figs. 13, A, B, C and D, 17, 18 and 19).



A B

Fig. 20. Roentgenographic studies of retained upper segment of a double kidney after resection of lower segment (Case IV). A. Plain plate. B. Pyelogram. Note thickness of renal cortex.

At operation the resection was carried from the cortex of the kidney toward the pedicle, in other words, the last division was that of the blood supply. The patient had a moderately stormy postoperative course, complicated by a mild bronchitis, a gastric upset and the development of a urinary fistula. However he was discharged in good condition on the twenty-fifth postoperative day.

The patient came in for reëxamination on March 16, 1928, seven and a half months after operation. He has gained from 35 to 40 lbs. and is the picture of health. He still has a little pain in the right kidney region, which we feel is due to a very mild residual pyelitis in the retained segment. However, the results of the function test, the plain roentgenogram (Fig. 20, A) and the pyelogram (Fig. 20, B) make us positive that our surgical course was quite justified. The patient has had no kidney lavages and should respond to this form of treatment and to urinary antiseptics.

We feel that the outcome of this case was very satisfactory.

Case V. (Double kidney, infected hydronephrosis of the lower segment, perinephritic abscess.) The patient, a physician aged fifty, consulted us in April, 1925, with a history of headache, frequency of urination and pus in the urine.

Roentgenographic examination revealed a duplication of the right renal pelvis and ureter. The lower segment, which formed about two-thirds of the kidney, was found to be hydronephrotic and infected (Fig. 21). The upper segment was not infected.

The general physical examination gave normal findings. The patient was given a course of kidney lavages but that did not eradicate the infection. For about a week before operation he began to have a more or less constant temperature of 100°. On May 27, 1925, the right kidney was explored. There was a small perinephritic abscess about the lower pole. The lower two-thirds of the kidney was resected; fat and fascia were replaced over the cut surface of the upper pole, after the edges of the latter had been approximated as well as possible with mattress sutures. Following operation the patient had a gastric upset for a few days and there was an intermittent discharge of a small amount of urine from the wound. He was dis-

charged from the hospital on the twenty-seventh postoperative day. The fistula finally closed two and a half months after operation.

FIG. 21. Pyelogram of infected hydronephrosis of lower segment of a double kidney (Case v). Note complete duplication of ureter.

When this patient was seen on February 29, 1928, nine months after the operation, the urine was practically normal, showing less than one pus cell per high power field. The patient had gained approximately 20 lbs. and looked quite well. His only complaint was of an occasional slight headache. He felt that his condition was quite improved. He would not consent to a cystoscopic examination; a plain roentgen-ray plate, however, showed the outline of the right kidney to be from one-half to two-thirds of the normal size.

We feel that in this case the operation has been a success, as the patient has gained in weight, the pyuria has been eliminated and there are no longer any subjective symptoms except for an occasional slight headache.

Renal Resection in a Case of Horseshoe Kidney:

CASE VI. (Calculus. Pyonephrosis involving the left half of a horseshoe kidney.) This patient, a man, aged thirty-one, consulted us on August 6, 1921, because of pain in the left lower quadrant of the abdomen and in the left testicle, frequency of urination, dysuria and pyuria.

Physical examination gave normal findings except in the genitourinary tract. Examination of the genital tract revealed a chronic prostatitis with stricture of the posterior urethra. Urological examination revealed a large calculous pyonephrosis of the left half of a horseshoe kidney. This was resected on January 16, 1922, the operation being followed by an uneventful recovery.

The patient again consulted us on February 22, 1927. At this time, approximately six years after operation, a pyelogram of the urinary tract showed a mild hydronephrosis. A function test showed that the right half of the horseshoe kidney was compensating completely for the left half which had been removed.

CONCLUSION

Renal surgery has gone through a number of phases: At first, it was quite conservative; later, it became radical; and now it is again becoming conservative. Arguments in favor of each phase can be offered. It must be remembered, however, that kidney tissue is necessary to life and that while at one time we have much more than we need, later we may be hard pressed and need every bit that we possess. Therefore we feel that in all cases the treatment of kidney lesions should be conservative, as the kidney can always be removed but can never be replaced.

We feel that this point of view has been justified by the results obtained in a number of cases in which the only treatment was the ligation of the accessory vessel obstructing the ureter. Two of these patients are entirely well, sixteen and nineteen years respectively after operation,

and they still have their kidneys. There are other instances in which one must go further and remove part of the kidney. This is the most radical test of conservatism. Renal resection must be done only after a very careful consideration of all the facts in the case. Furthermore, in all cases in which the patient has a subnormal amount of kidney tissue, either because of disease or as the result of operation, it is essential that he follow a rigid routine.

DISCUSSION

Dr. Lowsley. The surgeon should always leave as much of the kidney as possible. The sad end results all of us have seen, following the almost criminal carelessness with which some surgeons in the past have removed kidneys because of a big stone, have been brought very closely to us. We have seen several cases which had recurrent stones in a remaining kidney, the other having been removed just because the pelvis was filled with a stone which was difficult to remove.

The various methods of removing stones from the kidney are unimportant and the surgeon should use the method with which he is most familiar. Some years ago Dr. Keyes suggested draining the kidney through the pelvis, a very good method I am sure Dr. Lower will agree, for I have had a very trying experience with a man who was draining through a nephrectomy wound, despite our efforts to close it on two occasions.

The question of recurrent stones is very important in this connection. We have found that certain patients can be relieved of recurring stones by merely changing the quality of the urine. Alkaline stones are formed in the presence of infection and by changing the chemical reaction to acid the stones do not reform. It is a very simple matter and should be utilized more. It is sometimes a little difficult to do this if the patients have a distinct tendency to acidosis, but they soon learn to keep the urine acid free themselves; they learn by their feelings, which are far more accurate than even blood chemistry and other tests to tell when they are approaching acidosis. The chemical we have found most useful in this connection is sodium benzoate, which turns the urine to acid without causing the patient a great degree of discomfort.

Hydronephrosis is relieved by the improvement of drainage or by whatever means necessary. If the kidney is low, a belt will elevate it, take the kinks out and give proper drainage.

Dr. Furniss. To save the kidneys an early diagnosis is necessary. We must impress upon the profession the necessity of a complete urological study.

With strictures, especially those of the lower end of the ureter, we get our most satisfactory results. With stricture of the upper end of the ureter there is a dilation of the kidney pelvis in a downward and a forward direction. Should the upper end of the ureter be fixed, angulation takes place and a spur is formed. Such cases, after this spur formation has occurred, are not amenable to dilation to the extent of an ordinary stricture. Some form of plastic operation is necessary. Unfortunately the permanent results are unsatisfactory in the majority of cases.

In ureter angulations due to anomalous vessels running to the lower pole, often a nephropexy will relieve the condition; this, when feasible, is preferable to the division of the artery.

Dr. Lower's resections have been most satisfactory in those kidneys that have had a double pelvis. The more the diseased portion, the greater the damage to the blood supply and consequently the easier the operation of resection. I have had three cases where there has been a supernumerary ureter draining a hydronephrotic portion of the kidney and I have been able to resect the upper pole of the kidney with excellent results. We have to teach the general surgeon and the medical men to send these cases in before irreparable damage occurs.

Dr. Rathbun. It is not much of a trick to take out the kidney, but it requires surgical judgment and skill to save it.

I was glad to hear Dr. Lower speak of some of the cases of hydronephrosis, infection and otherwise, improved by dilating the ureter. It makes very little difference to the patient what we call the lesion back of his trouble; some call it stricture of the ureter. We see many of these cases, and the results from dilatation are very striking. My own experience has been that the patient is often relieved, the infection cleared up, and the functional capacity of the kidney much improved, although the pyelographic findings remain the same.

We are all more conservative in regard to stones and the method of approaching them.

Many stones are now removed by pyelotomy combined with small incisions in the cortex, going through to the tip of the calyx. Many of the large stones that we see in the kidney are better left alone. We all see many that produce no symptoms, and any operation short of nephrectomy is a dangerous procedure. An extensive nephrotomy might well leave the kidney of less value than before operation.

However, it sometimes happens that we see large stones which do produce symptoms, such, for example, as pain or hemorrhage, which should be removed and can only be removed by means of an extensive nephrotomy. One of the essential points in the technique is absolute control of hemorrhage. I think the plan suggested by Dr. Lower of covering the line of incision with a free transplant of muscle or fat, which I personally use, held in place by sutures, is very valuable.

A second point of tremendous importance is the absolute essential of drainage in these cases, whether infected or not. The accumulation of a very small amount of blood in the form of clots acts as a foreign body and will often provoke serious secondary hemorrhage. I have had two cases where secondary nephrectomy was required following a nephrotomy, which I believe could have been avoided had drainage been employed. I prefer to drain through the cortex.

My experience in resection of the kidney has been limited to four cases, two horseshoe kidneys and two solitary cysts. All of these made good recoveries. In the cases of horseshoe kidney we were able to identify and ligate the vessels going to the half of the kidney which was to be resected. In the cases of solitary cysts the vessels were temporarily controlled by elastic ligature and a wedge-shaped piece of kidney removed; hemostasis was cared for, including drainage of the renal pelvis.

Dr. Barringer. I have always been puzzled how to handle a hydronephrosis with the constriction at or near the plower pole of the kidney. This condition may or may not be due to an aberrant kidney vessel. If the diagnosis can be made of an aberrant kidney vessel, does Dr. Lower attempt dilatation first and, if this does not succeed, then resort to operation? Quinby does not cut the vessels but cuts the ureter and reimplants. Dr. Lower has swung back, I understand, to simply cutting the vessels if they do not supply too much of the kidney.

I have always feared nephrotomy a great deal because of the destruction of kidney tissue. Then Dr. Deming told us we do not really destroy kidney tissue if we keep the sutures very close to the incision. Lately I have done a nephrotomy for stone and kept the sutures close to the cut edges. A pyelogram after the operation showed the kidney to be pretty good and normal, and I believe I did not destroy much of the kidney.

Dr. Lower. Dr. Lowsley brought up some interesting and important points in regard to stones, especially regarding their reformation.

Dr. Furniss discussed the question of my being too conservative. I appreciate exactly what he has in mind. In the particular type of case he describes, that in which an aberrant blood vessel is the primary factor and the inflammation the secondary factor in the production of the obstruction, the division of the blood vessel is not sufficient but a plastic operation on the ureter is necessary.

Dr. Rathbun spoke of drainage. This I should have mentioned, for it is very important. In some of these cases which look almost hopeless persistent irrigation will often bring results. It requires a lot of patience and my associate, Dr. Belcher, who has been doing most of this work, has surprised me by the number of cases he has been able to clear up by keeping up the dilatation, irrigation and drainage.

Dr. Barringer asked about dilatation in the pyonephritic cases with aberrant blood vessels. Dilatation makes some of these cases decidedly worse. The late Dr. Peck showed a number of cases in which the ureter was kinked, with resultant damming back of the urine. In these he had made an opening through the cortex of the kidney and passed an ureteral catheter from above down, allowing the catheter to remain for some days. He said this was often followed by a straightening out of these kinks. I have never tried this procedure.

TREATMENT OF INOPERABLE AND POSTOPERATIVE URINARY TUBERCULOSIS*

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NEW YORK

SURGICAL treatment is the accepted treatment for most cases of tuberculosis of the urinary tract. There are patients, however, suffering from renal tuberculosis who, on account of bilateral infection or other active tuberculous lesions, are not operable. Others who have unilateral lesions may refuse operation or may need general building up before undergoing operation. Postoperative cases of urinary tuberculosis need medical care to make them comfortable and to keep the disease arrested in other parts of the body, if possible. The patient whose tuberculosis is all removed by the extirpation of one kidney is rare, and indeed fortunate. Thomas and Kinsella[1] state that these cases should have the advantage of sanatorium treatment, because they feel that both kidneys are primarily infected, and that the remaining kidney may become active at any time. They add that resistance to tuberculosis may be manifested in the kidney, as well as elsewhere, and report three cases that have shown tuberculosis arrested in infected kidneys after two and one-half to three years, and show pyelograms which demonstrate improvement.

A recent survey at the New York Hospital of 40 postoperative nephrectomies for tuberculosis, done in the past five years, showed that none who survived the operation had died in that time, but many were invalids and uncomfortable, due to urinary or general symptoms.

In 1926 a clinic was organized in this hospital for the care of tuberculosis of the urinary tract. Dr. Wang, who has done special work in general tuberculosis, took charge of the medical work, while the urological side of the work was in charge of the clinic's urologist. This plan of having a phthisis expert and urologist working in conjunction has been most satisfactory from both a practical and psychological point of view, as the patient is comforted to know that his local condition is not being neglected while the general treatment is being carried out.

It is well to emphasize that this clinic is not endeavoring to replace surgery, but is acting only as an adjunct, taking care of postoperative cases, building up preoperative cases and caring for inoperable ones. The diagnosis of renal tuberculosis must be too late ever to hope to make it a medical disease, for if it is made by pyelography, considerable destruction of tissue by phthisis must be present to give a typical picture. Cortical lesions may not show at all by this method. Diagnosis by bacterial tests also must be accompanied by destruction, as shown by decreased function, etc., to differentiate a surgical kidney from a mere microscopic infection which may heal. Thomas believes also that the finding of tubercle bacilli in the urine from the kidney means a lesion in that kidney, which he considers becomes healed if later findings do not show evidence of tuberculosis of the kidney. This theory is probably correct from a pathological standpoint but should not mislead the clinician to treat cases with bacilluria only too radically, or to treat cases with phthisis of the kidney too conservatively.

Medical care of postoperative and inoperable urinary tuberculosis cases is a careful regime. The results obtained

[1] Thomas, G. J. and Kinsella, T. J. Some data concerning clinical course of renal tuberculosis. *J. Urol.*, 19: 95, 1928.

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, February 15, 1928.

depend a great deal upon the cooperation of the patient, and those who have been most faithful have shown the best results.

TABLE GIVING DETAILS OF CASES TREATED

Name	Age	Diagnosis	Operation and Complications	Urinary Symptoms, etc.	Mos.	Orig. Wght.	Later Wght.	Remarks
S. A.....	28	Left tb. epididymis	Right (1921-tb.) epididymectomy	None	9	119	127	At work. Slight local improv.
T. C. L.....	40	Bilateral tb. epididymis	None	None	6	150	150	Lung tb. active. Sent to sanatorium
H. B.....	22	Bilateral tb. kidney	Inactive pulmonary	Pain over left kidney	8	123	126	Slight gain
H. L.....	23	Bilateral tb. kidney	None	Lost 10 lbs. in 6 mos. Dysuria night sweats	13	146	173	Pain in rt. kidney. Few symptoms
C. P.....	26	Bilateral tb. kidney	None	Frequency — 5 min. Night sweats	20	102	127	Frequency ½–1 hr. No dysuria
M. M.....	40	Right tb. kidney	Refused operation	Incontinence — frequency dysuria— positive G. P.	14	147	154	No symptoms
M. R.....	42	Right tb. kidney	Right nephrectomy	Frequency	6	200	218	No symptoms
L. C.....	49	Left tb. kidney	Left nephrectomy	Nocturia 3–4. Pain over bladder	1	164	170	Feels better
A. D.....	45	Left kid. tb. pul. inact. bilat. epididymis	Nephrectomy bilat. epididymect.	Frequency, nycturia	10	149	165	Occasional frequency
S. G.....	40	Left tb. kidney pulmonary inactive	Left nephrectomy	Frequency occ. hematuria	12	131	151	Positive G. P. Pain over bladder
C. G.....	44	Left tb. kidney	Left nephrectomy	Dysuria	10	136	171	Intermittent frequency
J. R.....	42	Right tb. kidney	Right nephrectomy	Frequency dysuria	12	197	203	Occasional pain over bladder

The routine followed is a combination of diet, hygiene, old tuberculin administration, quartz light, and local treatment. While there is nothing new or original in the method, the preliminary results obtained have been very encouraging.

The diet recommended is one that will tend to increase the weight of the patient. The addition of one quart of milk a day, two ounces of olive oil and cod liver oil have been most successful.

General hygienic measures of a daily bath, ten hours sleep in a well ventilated room, daily rest intervals, sunshine and fresh air are encouraged.

Biweekly application of the air-cooled mercury quartz light is given in the clinic. The light is used in increasing amounts until the patient receives ten minutes exposure at 12 inches distance. The water-cooled mercury vapor quartz lamp is often used to vary the reaction, and is most useful in the epididymitis cases.

Old tuberculin is given in cases without active pulmonary involvement. The initial dosage of 1 c.c. of .000001 is gradually increased until there is a local skin reaction. The dosage is then dropped to a point just below this, and given twice a week.

The local treatment in cystitis cases has been varied according to the individual needs. Methylene blue and alkalinization of the urine seem to be the most helpful simple means so far used, although most of the urinary antiseptics and local instillations have been given a trial.

Twelve cases, including representative cases of each of the kinds treated in the

clinic, have been observed from one to twenty months. Eleven of the twelve gained in weight. One who was an alcoholic and whose pulmonary lesion became active, had the same weight at the end of six months. He was sent to a sanatorium. One bilateral renal tuberculosis case gained 25 pounds in weight. Her local symptoms and general health have been remarkably improved after twenty months. One case with unilateral tuberculosis of the kidney who refused operation has gained 7 pounds, and is symptom free after fourteen months. We hope to gain her permission to do another pyelogram and to observe the kidney condition at the present time.

CONCLUSIONS

1. Inoperable and postoperative cases of tuberculosis of the urinary tract should have the benefit of medical treatment.
2. The clinic at the New York Hospital has been established too recently to give more than preliminary observations. These are encouraging and should stimulate others to collaborate in this work.
3. Medical care of these cases is an adjunct but it is not a substitute for surgical care.

SEPTICEMIA

In the early stages, even after repeated predatory incursions of bacteria, the microbic raids may cease and recovery take place, and recovery may also follow if the bacteria are cut off from entering the circulation or if the focus be completely removed. Every phase of this contest between the organisms and the body cells is seen. Now one, now the other, seems to be victorious. All manner of transitional forms exist. There are periods in which the bacteria are being killed or taken prisoner as soon as they appear. There are periods in which they are completely victorious. In looking at the contest at any given moment, it may be impossible to determine the outcome. It may be impossible, when living organisms are found in the blood stream, to be sure whether they are multiplying there or whether they are pouring into the stream from various foci. It is for this reason that the term septicemia is no longer defined as a condition in which the organisms are actually multiplying in the blood current. The conception of septicemia today implies the presence of living pathogenic microorganisms in the circulating blood.

It might be better to discard the word septicemia altogether and speak of sepsis with bacteriemia; many of the modern pathologies have actually discarded it. (*From "Septicemia" Walton Martin. Practical Lectures on the Specialties of Medicine & Surgery*, 1924–26. N. Y. *Hoeber*, 1927.)

SOME IMPRESSIONS AFTER REVIEWING CASES OF MALE GENITAL TUBERCULOSIS AT BELLEVUE HOSPITAL*

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GENITAL tuberculosis in the male comprises tuberculous inflammation of the penis, urethra, prostate, vasa deferentia, seminal vesicles, epididymes and testes. Epididymitis is the commonest manifestation of genital tuberculosis which brings these cases under medical observation. Barney in Cabot's Urology, 1918, now ten years old, says in the beginning of his article, "Tuberculosis of the genital tract in the male commences in the epididymis," while Young,[1] in his article in the *Archives of Surgery* has presented much evidence to support the earlier view that tuberculosis begins in the genital tract in the seminal vesicle. Moot points and problems adhere to almost every statement to be made in regard to pathogenesis and every phase of this subject.

The material at Bellevue Hospital on tuberculosis of the genital tract is practically confined to and is listed under "tuberculous epididymitis." There have been so far as I can find but three cases, for example, in which radical removal of the epididymes, vasa deferentia, seminal vesicles and portions of the prostate have been undertaken. Out of 149 cases, listed under "tuberculous epididymitis" in the past nine years, which had been operated upon but 2 per cent have presented such features as to render the likelihood of complete eradication probable in the judgment of the director and staff. We have then too few cases of this sort to permit comment.

Our records at Bellevue fall in fairly well with most statistical statements concerning genital tuberculosis. This is so striking that after classifying and bracketing a variety of features and finding that no particularly instructive variations were elicited, I decided to give only impressions.

The subject of genital infections at Bellevue has not lain fallow. Some of the members of the staff have already reviewed most of the records allied to this subject. Dr. M. F. Campbell reported[1] last year upon 3,000 cases of gonorrheal epididymitis, and elsewhere reported[2] its treatment. He shows that out of 3,606 cases of epididymitis admitted to the Urological Service at Bellevue, 3,000 were gonorrheal in origin, 280 (8 per cent) were due to the tubercle bacillus and 326 (9 per cent) were of other etiology. Dr. Stevens[3] in 1922 made a study of the differentiation between tuberculous and non-tuberculous inflammations of the epididymis.

There follow a few figures that I am responsible for regarding tuberculosis of the epididymis, with here and there a marked variation due to many factors which I will not go into; these agree fairly closely with many standard compilations.

Cases revealing clinical evidences of tuberculosis of the lungs, bone, urinary tract (that is, primary tuberculosis in other parts of the body) number 55 per cent. Barney reported 56 per cent on the same basis, while many reports

[1] YOUNG, H. H. The radical cure of tuberculosis of seminal tract. *Arch. Surg.*, 4: 339, 1922.

[1] CAMPBELL, M. F. Gonococcus epididymitis. *Ann. Surg.*, 86: 577, 1927.

[2] CAMPBELL, M. F. Treatment of acute epididymitis. *J. A. M. A.*, 89: 2108, 1927.

[3] Trans. Am. Assn. G. U. Surg., Vol. XV, 1922.

* Read before New York Meeting, American Urological Association, March 28, 1928.

are much higher. If more thorough physical examination, apart from the genital and urinary tracts, were always made and recorded, this estimate would we believe be much higher. While numerous cases have had skillful medical examination and roentgen-ray examination of chest, bones and kidneys, we must regretfully record that in the great majority of cases few recorded facts regarding generalized tuberculosis are to be extracted from our histories. In our cases tuberculous epididymitis was unilateral in a little over 50 per cent, bilateral in a little under 50 per cent. We have had pathological laboratory reports in about 86 per cent of all cases. It is to be said that examinations of tissue are really made in a still larger percentage but our system of filing and human frailty account for the failure of 14 per cent recorded on the charts. Dr. Campbell has with enormous labor searched out laboratory records, and I find his tracks on many of the histories which the house staff had failed to fill in. Previous gonorrhea is reported in over 50 per cent of all cases. Trauma as the patient's explanation of the beginning of the epididymitis was found in about 10 per cent of cases. Signs that the prostate was involved so as to lead to a clinical diagnosis of tuberculosis were present in 44 per cent of the cases, and one or both seminal vesicles revealed similar evidence in 36 per cent of cases.

I find that about 4 per cent revealed definite signs of renal tuberculosis through catheterization of ureters and the demonstration of tubercle bacilli. A small number of cases, about 2 per cent, died in the hospital who presented signs of general miliary tuberculosis before death or at autopsy. Nearly one-fifth of our cases with unilateral tuberculous epididymitis returned to the service later for subsequent treatment, that is, for the treatment of persistent sinuses, the development of a lesion in the other epididymis, etc. Five per cent of cases subjected to epididymectomy demand orchidectomy later. About 60 per cent of cases operated upon had the epididymis only removed, while orchidectomy was performed in the remaining 40 per cent. The average stay in the hospital after operation was ten days.

In expressing even impressions regarding this material, one is prone to fall back upon personal experience in private practice where an entirely different set of circumstances prevails. But I think it is worth while to give some expression of belief, that is, convictions based upon experience, and to take full responsibility for any such statements with the understanding that the director of the service and other members of the staff are in no way responsible for these opinions.

Epididymectomy is a comparatively recent procedure. Previous to twenty years ago, the usual surgical method for tuberculosis of the epididymis was an orchidectomy, and this was commonly done by all urologists as well as general surgeons. The separation of the epididymis which is diseased from the testis which is not diseased is now a common experience with most of us, but we still find that no distinction is made between epididymitis and orchitis by a great majority of general surgeons and that orchidectomy, that is, complete removal of the contents of one side of the scrotum, is still commonly carried out as soon as tuberculosis is believed to be the cause of the disease.

We are confident that a great advance has been made in this separation of epididymis, leaving a normal testis with its blood supply in the scrotum, and that a goodly proportion of these testes remain normal. Epididymectomy removes the major external lesion of genital tuberculosis, prevents the formation of many tuberculous sinuses or removes those which have formed. It relieves pain. It is followed in a great number of cases by notable improvements or complete disappearance of the abnormal features of its collateral seminal vesicle and the same side of the prostate (ejaculatory duct). While it is true that over 50 per cent show an involvement of the

second epididymis later, a good many cases never develop epididymitis on the side normal at the time of operation. These results have led to the program of proceeding immediately to operation as soon as the clinical signs point strongly to a diagnosis of tuberculous epididymitis. The operation is done under novocaine, local or spinal. This becomes then an exploratory operation and the observation of the tissue exposed usually strengthens the working diagnosis and permits of the examination of the testis. If the testis is seen to be involved, occasionally small lesions are excised or curetted from it, and the testis is replaced in the scrotum. If, however, the testis is seen to be extensively involved, the entire cord is ligated, amputated, and the scrotal contents of that side removed.

While it is recorded that tubercle bacilli may be found in tuberculosis of the prostate and the seminal vesicles, our experience is that tubercle bacilli are rarely found in the urine of these cases at Bellevue Hospital. When tubercle bacilli are found in the urine we are strongly suspicious that a renal tuberculosis exists and these patients are studied by the usual methods for determining renal tuberculosis.

As to differential diagnosis, it has often been demonstrated to us that all signs fail frequently. Head or tail involvement is no more pathognomonic than the flip of a coin. Beading of the vas is common with non-tuberculous disease. Diffuse thickening of the vas is as common with tuberculosis as with pyogenic or gonorrheal vas inflammation. Abscess of the epididymis involving the testis is common with pyogenic infection. The old chronic process with chronic thickening of the seminal vesicles and prostate and an epididymo-skin fistula is usually tuberculous. Torsion of the testes in the late phases closely simulates tuberculosis. Dr. A. R. Stevens, in his article referred to above, has formulated the following guarded statements as conclusions:

1. Double epididymitis found on examination slightly favors the diagnosis of tuberculosis.

2. A prior orchidectomy or epididymectomy almost invariably means tuberculosis.

3. A scrotal sinus of over a month's duration is probably tuberculosis (but may lead to a gumma).

4. Tuberculosis elsewhere in the body means genital tuberculosis in over 90 per cent of such cases.

In the diagnosis of cases of over one month's duration, we derive some help from the rectal examination. The older the lesion, the more does definite involvement of the prostate and seminal vesicles point to tuberculosis; after six months, this becomes a marked factor in favor of tuberculosis.

Finally, it must be emphasized that simple inflammatory changes of the epididymis may last as long as tuberculosis. There were 4 of 35 non-tuberculous epididymitis cases who sought advice three years or more after onset of the swelling, and but 4 of 74 tuberculous cases with a similarly long history.

In hospital practice, with such material as we have at Bellevue Hospital, where it is practically impossible to successfully follow the great majority of cases and where many of these patients failed to follow any directions for after treatment, we are convinced that we are doing the best for the individual in removing a manifest tuberculous lesion. In private practice, those of us who are old have observed many cases in the course of the years presenting all the physical signs of tuberculous epididymitis, who have never been operated upon and never will be operated upon. The process has been arrested, has resulted in small nodules easily palpable and gives the patient no discomfort and no difficulty of any kind. While it is difficult to prognosticate this favorable self-healing in any given case, we are constantly confronted with cases of acute epididymitis which go on in the course of a few months or years to give the characteristic signs of tuberculosis and yet they maintain excellent health, they consider the lesion a trivial one, they may be known to have tuberculosis in lung or bone, and perhaps refuse our advice that this lesion be removed. Cases

at Bellevue are operated upon or are discharged at their own risk. I am convinced that there are cases which any operative procedure serves to excite into a flare up of tuberculosis in the genital tract or elsewhere in the body. Is it not possible, through some method of treatment other than operation, to bring about body resistance and arrest of the disease? There is a ray of hope to be seen in the elaborate study of the chemistry and biology of the tubercle bacillus now going on under the auspices of the National Tuberculosis and Health Association. Heliotherapy (Alpine light) is utilized for most of these cases after operation at Bellevue during their short stay at the hospital, but the time is too short to record any definite results from this recognized form of treatment.

It is, however, recognized in many sanatoriums for tuberculous patients that genital tract lesions are arrested and give no symptoms. There is still considerable difference of opinion among physicians specializing in the care of pulmonary tuberculosis as to the treatment of the genital tract lesions, some advising early operation, others keeping their cases out of the hands of surgeons. We agree with Young who has said, "It is futile to expect to eradicate the disease through removal of the epididymis or the testis," or with Keyes who in 1907 said, "Tuberculosis is a disseminated infection which cannot be amputated," and with Cunningham who in 1916 said, "End results after these operations showing so high a mortality as 85 per cent are far from satisfactory." Epididymectomy and castration are palliative procedures which remove a gross focus of tuberculosis and have a favorable influence upon the diseased portions of the genital tract, lessening the burden which the body must bear in resisting this systemic disease. Our operative treatment of these cases cures rarely, if ever.

Tuberculosis is a disease which when found in the genital tract is by all students of the subject agreed to be chronic and generalized. At all events there are in the overwhelming majority of cases at least two foci in the body, a pulmonary or glandular locus as the primary focus and a genital locus as a secondary focus. The entire disease cannot be eradicated by surgery. The ideal complete eradication of the disease from the seminal tracts, leaving the seminal glands and the healthy resected prostate at best removes only the secondary focus.

That secondary involvement has manifested itself points to the fact that some so-called primary focus is active enough to allow the escape of bacteria, and further metastases may be looked for unless the resistance of that patient can be increased so that the primary focus again becomes quiescent, arrested, walled-off. The only adequate treatment, then, of genital tuberculosis is the treatment of the primary focus, i.e., the treatment of the disease, tuberculosis. Whether we amputate the epididymis or amputate the genital tract, we are simply carrying out a palliative procedure for that human body. We may eradicate the seminal tract but we are not eradicating the tuberculosis from that body.

Extensive operations and very difficult, prolonged and hazardous dissections, are championed by a few of our distinguished friends for the complete eradication of the disease in the seminal tract. The surgeon is advised boldly to do the whole job and discard the partial resection which has been and is being carried out now at Bellevue. I dissent from this view. To my mind both are in the larger sense palliative operative procedures. One is much less of a tax on the tuberculous patient than the other. In selected cases only should removal of the seminal tracts be attempted.

Bellevue is an institution for the poor of the city. Most of these patients come to us with generalized tuberculosis out of conditions of living and labor the worst possible, and they must commonly return to the same unhygienic surroundings, bad air,

poor food and hard labor at the earliest opportunity. The hospital itself cannot maintain them for a prolonged residence and is not designed as a sanatorium for the cure of tuberculosis. These patients cannot be given ideal altitude, clear air, direct sunshine, prolonged rest and selected food of the highest quality, before, during and after their surgical operation. It seems to me that these are factors to weigh in the balance with the extensive radical effort at eradication which is only partial against the simpler, less exhausting, less hazardous partial removal. Are we giving the individual a better chance against the tuberculosis which he brought with him to the hospital and which, in spite of whatever surgical procedure we carry out, he certainly takes back home again?

Doctor Whiteside, I believe, finally advised against his plan of radical removal of genital tuberculosis "if the patient had pulmonary tuberculosis" because they "all seemed to die of it" and to have gained only a short period of comfort from his extensive dissection. This would cut down the cases that he, at any rate, would regard as suitable to a minimum minus if some of our pulmonary experts could look them over. The dissection of tuberculosis out of a prostate and the removal of seminal vesicles plastered about with tuberculosis resembles somewhat the whittling out of carcinoma from the prostate and seminal vesicles. In my hands and in those of most surgeons whose work I have observed, some tuberculous tissue is going to be left behind and perforations into the urinary channels at operation and from later tuberculous ulcerations are likely to leave such patients in that deplorable state with persistent fistulae or urinary incontinence which does not give peace of mind and contentment to help in overcoming that tuberculosis which they still have to combat.

SOME CLINICAL OBSERVATIONS ON TUMORS OF THE BLADDER*

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I LOOK upon tumors of the bladder as the most discouraging and trying of the relatively common conditions with which those of us who are interested in urinary surgery have to deal. Unlike prostatic disease tumors of the bladder occur commonly in both sexes, though in my experience somewhat more commonly in men than in women. I regret to say that I do not come with any solution that I can offer for this problem, but simply to present certain of my experiences with it and to urge the more vigorous following of a few principles that I believe are fundamental in the treatment of the condition and which make for better results.

It is my hope that by getting together and hearing different men's experiences, their successes, and their failures, we may be able to arrive at a conclusion as to what is the wisest course to follow with these growths. I am loathe to believe that we are going to be forced to confess that all we can do is simply to palliate this condition.

According to my records my experience with the operative treatment of bladder tumors began about twenty years ago and since that time I have accumulated notes, some unfortunately very imperfect, on about 300 such cases that have come under my care. I find that in 128 of these cases I have made an attempt to remove the growth by open incision, believing as I do that these growths take their origin in a small area and must at some time be completely removable. These attempts to remove tumors of the bladder have varied from the simple cutting around the growth with a knife, scissors, or cautery, to the total removal of the bladder and reimplantation of the ureters. With infiltrating growths I have for the most part made it a practice to remove a large section of the full thickness of the bladder wall, opening the peritoneum, if that was necessary and reimplanting the ureters in a considerable proportion of the cases. While I have intended to remove these growths with a wide margin I fear that in some instances I have fallen short of my purpose. I have not made any attempt to tabulate the times that I have carried out each procedure.

Beside the cases in which I have attempted to extirpate bladder tumors, there have been 54 cases in which I have done a purely palliative operation. Sometimes this has been simply a cystotomy for drainage; at other times it has consisted in taking out a portion of the growth; in some instances, it has been a more or less deep cauterization of the growth, while in others the attempt at palliation has consisted of the application of an actual cautery together with the implantation of radium, sometimes with the use of radium alone. Latterly I have tried diathermy as a palliative measure in a few cases.

In addition to the cases in which an attempt has been made at excision, or those in which I have done a palliative operation, I find records of 42 cases in which the condition was so hopeless that I advised that nothing be done. Then there are 33 cases in which I urged operation but in which the patients did not see fit to follow my advice. Most of the remaining cases have been simple papillomas in which fulguration through a cystoscope has been used, for the most part, with satisfactory results.

I shall not consider this group of papil-

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lomas further than to say that I believe fulguration is the ideal treatment for the small simple papillomas, but that I believe one should be careful to follow up his papilloma cases; further that in instances in which the growths do not disappear promptly, it is wiser to resort to open surgery and their wide removal. I have come to be very suspicious too of the multiple papillomas. In my experience a large number of them prove to be carcinomas. Within a month I have removed a small mass at the vertex of the bladder, which, according to the pathologist, proved to be a squamous-celled carcinoma of high malignancy. This patient had presented five small papillomatous masses when seen by a colleague in another city a year and one-half before. Four of these had disappeared easily under fulguration while the fifth had been refractory to fulguration in his hands as well as in mine. In another instance a beginning carcinoma that proved to be very malignant and went on to a fatal termination had been treated by fulguration over a considerable time by a competent colleague in a distant city.

I often wonder if in cases of this type we are not watching the change from normal mucosa into papillomata, which I look upon as precancerous or perhaps better as premalignant conditions, and then the degeneration of these papillomata into true carcinomata.

Of these 257 cases of bladder tumor, most of which proved to be malignant or potentially malignant I find that 126 are known to have died, while the condition of 28 more was such at the time of my last note that it seemed impossible that life could be prolonged for any material time and I think they may very properly be considered as dead by this time. Beside these there is a considerable list of cases that are unaccounted for; undoubtedly some of these have died.

This is a very discouraging showing even when making allowance for the fact that we are dealing with a condition that is necessarily fatal if allowed to take its natural course. In going over these cases I have made an attempt to find out to what this heavy mortality is due, and if there is no way that we can lessen it. Look at this subject as one may, one is forced to the conclusion that it is the late appearance of these patients that is the great underlying cause of our lack of success. It may not always be that the appearance of the patient is actually late when considered in relation to the length of time that the patient has had symptoms, but it is late as regards the progress of the disease, and usually late as regards the appearance of symptoms as well.

It is hard to calculate the immediate operative mortality of these cases. There were 24 who died in the hospital and in whom I felt the operation was a factor in the fatal outcome. In some of them the outcome was directly the result of the operative procedure, as in one who died on the table. In others the connection between the operation and the fatal outcome was not as clear.

Beside this immediate mortality I find that among the cases in which I had attempted a radical removal of a growth there were 61 that were known to have had local recurrences. Nine of these 61 cases showed two recurrences following operation, while two cases showed three recurrences. These recurrences show that in theory at least, there was something radically wrong in my treatment; either I was unwise in my selection of cases, attempting the impossible, or I did not do a sufficiently wide removal of the growth to bring about a successful result. In either case I believe a part of the blame may be fairly laid to the late appearance of the patients.

As a rule the longer the time that elapses between the appearance of symptoms and operation, the poorer the condition of the patient, the more extensive the operation required, and consequently the greater the mortality. I cannot illustrate this better than by citing the extreme case

of the patient who died on the table. She had bled more or less for nearly ten years and frequently for the five years immediately preceding operation. During this time her physician and I had urged her strongly to submit to operation. When she finally consented she was marble white, exsanguinated; had a haemoglobin of 35 per cent, and 1,600,000 reds. She was transfused and at the time, advised by the consulting hematologist, I operated, removing from her bladder handfuls of what proved to be papillary carcinoma. There was profuse bleeding until I cleared the bladder of the growth and packed it; the patient died just as I finished closing the incision. This was an extreme case of procrastination but many of lesser degree, I am sure, add materially to the mortality of tumors of the bladder.

Some years ago I had a number of case histories gone over and found that the average time between the appearance of symptoms, bleeding in a good proportion of cases, and the time that the patient came for diagnosis, was 1.7 years. A few years later we found that the figures in another series of cases were 1.5 years, practically the same. On the other hand, it is only fair to say that one does not always find that the extent of a growth is in direct ratio to the time that has elapsed since the patient presented symptoms. A patient of sixty-five, seen a year ago, had had pain referred to his groin and bladder for a short time. He had been getting up several times at night and his calls to urinate had been imperative. Three days before I saw him he had passed blood for the first time. Cystoscopy showed almost the whole of this man's bladder involved in an infiltrating growth. I removed what I estimated to be from ¾ to ⅘ of his bladder, reimplanting his left ureter. The growth was reported to be "carcinoma of high malignancy." I saw this man just about a year after his operation; his suprapubic wound had been a very long time in healing, in fact had only recently closed. His urine was clear though he said he could not hold much. He had gained in weight and was very comfortable but for his frequency. I do not cite this case as a probable cure but as an example of the fact that one cannot have these cases investigated too soon, that the first symptom may not appear until the process is well advanced, though the rule is that there is more or less of a ratio between the extent of the growth and the duration of symptoms.

As to results, I am afraid my optimism is not founded so much in past accomplishments as in high hopes for things that are yet to come. My results have been sufficient to convince me that painstaking work will allow us to save a considerable number of patients with this disease, which, if allowed to run its course, has a mortality of practically 100 per cent. Besides the ones in which we may eradicate the disease, I believe we are going to be able to do considerably more in the way of making life longer and more comfortable for many people in whom our efforts will prove to be only palliative.

I have a considerable number of patients who have been well for various periods of from one to five years, but when one has seen, as I have within a few months, two recurrences or reappearance of carcinoma of the bladder, if you prefer that term, in patients whose primary operations were respectively five and eight years ago, one gets less comfort from these shorter periods of apparent cure. Among my experiences with this disease that have been encouraging are the cases of a man of forty-five from whom I removed a small growth, microscopically carcinoma, in 1914; he was well in 1926. Then there was, and I believe is, a man of sixty-four who had a carcinoma removed ten years ago and who I was told by an acquaintance had every appearance of health a few months back.

A woman from whom I removed a squamous-celled carcinoma in 1913, reimplanting her right ureter, was reported as well in 1925 and she is, I believe, still living and well. Still another patient, a woman from whom I removed in 1918 a

growth involving the left ureter, was reported to be well by her physician a few weeks ago.

Other encouraging cases have been a woman who died of cardiorenal disease, without having shown any sign of bladder trouble, seven years after I had removed a "malignant papilloma"; a man who died of cerebral hemorrhage nine years after I had resected his bladder for a large carcinoma and who had at no time shown any evidence of recurrence, as well as another man who died suddenly ten years after operation, without any symptom of recurrence of his bladder growth. These cases are encouraging even in the face of the case of a man, from the left side of whose bladder I removed quite a mass of papillomatous-looking material in 1911, and on which the report was "early cancer of the bladder;" in 1916 this man had a small recurrence on the other side of his bladder which was apparently successfully treated by fulguration. Naturally it was not possible to make any microscopical examination of this tissue. In 1918 this man's bladder was negative on cystoscopy. In 1924 he reported that he was without symptoms but was not examined. In 1926 he returned with marked frequency and urinary discomfort; there was a small, benign-feeling prostate and a purplish mass as big as the tip of my thumb on the left of his bladder outlet. I thought of a tumor of the bladder secondary to a malignant prostate but the microscopical report on the bladder growth was carcinoma while that on the prostate was adenomatous hypertrophy. This man made a good operative recovery. In March, 1927, he had a recurrence of symptoms and there was a definite recurrence of the growth on both sides of his bladder outlet. The situation was explained to him and he chose a cystectomy and implantation of his ureters rather than a palliative operation. His bladder was removed April 9, 1927. As his condition would not allow me to implant his ureters into the sigmoid at that time, soft catheters were introduced into both ureters and the catheters brought out through his urethra. This man did well at first but then failed and died the fourth day after operation. No autopsy was obtained. Had carcinoma been present in this man's bladder from 1911 to 1926, or had it arisen anew on three occasions, in a bladder that was peculiarly susceptible to malignant degeneration?

The foregoing represents in a general way my experience with tumors of the bladder in the past twenty years. What hope can we see that our treatment in the next twenty years will give any better results? I certainly see no panacea for tumors of the bladder but I do believe that there are several things that are going to make for better results. My opinion is that for better results, and by better results I mean a larger number of patients who have no recurrence after the removal of a bladder tumor, we must depend upon three things; first, the earlier recognition of cancer of the bladder; second, its wide and complete removal locally, and finally we must see to it that there is no interference with the kidney function, due to interference with a ureter by growth or scar.

In the first place there is an aroused suspiciousness of cancer in general going through the whole community that is going to make it easier for us to get patients earlier.

We have tried for years to impress upon the medical public, especially the general practitioner, the frequency with which urinary hemorrhage means malignant disease, 64 per cent in one set of cases that I tabulated, and yet, within the last month, I have seen four patients with tumors of the bladder, who illustrate how slowly this truth has permeated the medical public. One case, a man, appeared a few days ago with his bladder filled with great, shaggy masses and who had passed a number of small phosphatic stones of the type sometimes called "cancer caps." The patient told me that his first bleeding came on while he was in another hospital more than three years ago. Another patient

from whom I removed a large papillary carcinoma this last month first started bleeding in February, 1927. A third with a large carcinoma of the bladder, for whom I could do only a palliative operation, had been bleeding for five months. A fourth, who presented a large papillary tumor of his bladder, had his first bleeding one and one-half years ago.

In bladder tumors almost all hemorrhages are due to the rupture of little vessels in the growth, and are not a necessary part of the process but a by-product, so to speak; they are usually intermittent and cease without treatment; this is especially true of the early ones. The general practitioner sees these people first and gives them some simple medication. The bleeding stops and both the doctor and the patient are happy in their belief that the condition was not an important one. This is often repeated several times before either the doctor or the patient feels the importance of a careful investigation; in the meantime the disease has progressed steadily. Not only must we teach the general practitioner that the burden of proof as to the lack of importance of any urinary hemorrhage rests upon him, but we must go still further than that if we are to get our cases of tumors of the bladder early. We must impress the general medical public with the fact that in a considerable number of cases the congestion or ulceration and consequent rupture of little vessels in tumors of the bladder which produce hematuria are not always early manifestations. A certain number of patients simply have urinary discomfort and if we are to recognize these cases and get them while a cure is still possible, they must be seen and cystoscoped early.

None of the new pathological work about the relative malignancy of tumors has any bearing on our preoperative diagnosis and determination of what course one should advise a given patient to follow. When it comes to a question of recurrences or metastasis, if this misfortune should occur, then the knowledge of the grade of malignancy of a given tumor may be most desirable and may exert a decided influence on the course that we follow. Our cystoscopic diagnosis will have to be depended upon to determine what course we should follow in a given bladder tumor. All are malignant or potentially so and should be destroyed if this is possible. The question is what is the best method to apply to the tumor in hand. With a single small papilloma there can be no question that fulguration through a cystoscope is the method of choice. With multiple papillomata, fulguration may be tried but refractory cases must be subjected to open operation. All cases should be subjected to periodical cystoscopic examination for a considerable time after fulguration.

In my opinion, the only curative treatment for a tumor of the bladder that is of any size or that is of the infiltrative type, is its total destruction, and this is most easily carried out by the open surgical removal of the tumor with a wide margin. The number of local recurrences show how inadequate many of my own operations have been. The necessity of a removal that is very much wider than our usual rule, that of a centimeter from the edge of the growth, has been brought home to me, especially of late, by finding that some carcinomas, which I assume in a certain number of instances begin below the surface in the wall of the bladder, have a wider extension under the mucosa than is apparent from surface indications. In a considerable proportion of cases one will have to reimplant at least one ureter.

Quite a favorite place for tumors of the bladder is about the bladder outlet, often just above it and while one occasionally stamps out the disease in this situation by a local removal of the tumor, in most instances attempts to cure disease so located will necessitate diversion of the urine either into the loins or into the rectum or vagina, together with removal of the bladder outlet, which implies of course, total cystectomy.

Such clinical knowledge as we have

would lead one to believe that lymphatic dissemination of malignant disease of the bladder takes place relatively late. However, it certainly does take place and I now believe much more commonly and earlier than I thought a few years ago. A certain number of autopsies that I have had recently in cases of this sort have convinced me of the fact that lymphatic extension of the disease to the sacral, iliac and retroperitoneal glands is by no means rare. There are things that suggest that not only do we have this lymphatic dissemination of the disease to fear, but that we have an occasional dissemination which takes place probably through the blood vessels. It is hard to believe that the metastasis which we see in bones is lymph borne and I wonder too about those in the lungs and liver. This is another reason why any rational attempt at the cure of bladder tumors must begin with the early and wide removal of the local growth, that we must not depend upon the supposition that lymphatic or blood borne extensions take place relatively late.

Our opportunity to cure a malignant process comes, I believe, at the time of the first operation; at first the disease must be local. Our recurrences indicate as a rule that we did not reach the boundaries of the diseased areas rather than that the edges of the incision received implants at the time of operation. There can be no doubt that we have implantations of the disease in the operative wounds but I believe that recurrences due to this cause are relatively uncommon compared with the local recurrences due to the leaving of malignant tissue. A very typical illustration of the fact that we can have recurrences due to implantations was met in the case of a woman of fifty-nine, seen in 1922, and from the left side of whose bladder I removed a pedicled mass as large as a billiard ball. The pedicle did not seem infiltrated but it was removed with a wide section of bladder wall and radium was implanted. Microscopically sections of the pedicle showed it was carcinoma. Eight months later I removed a recurrence in the abdominal scar; this involved the tissue as deep as the bladder wall but apparently not the bladder itself. It was likewise carcinoma microscopically. Fifteen months after her first operation I removed some carcinomatous glands from her left groin. Twenty-three months after her first operation a mass as large as a hen's egg appeared to the right of the umbilicus; it was removed and proved to be carcinoma. The peritoneum was adherent to the omentum at two places; the growth was carcinoma. The patient died eight days later of cerebral hemorrhage. At the time of the last operation there was a small suspicious place in her bladder the size of a bean, probably a recurrence.

Another point that has been brought home to me by my attempts to do more radical surgery on tumors of the bladder is the fact that interference with the renal function has probably been a large element in the fatal outcome in many of our cases of this condition. The reimplantation of ureters has shown how common it is to have them dilated, sometimes very much so, due I believe to obstruction at the bladder. In one man who died some weeks after the implantation of a very much dilated ureter, we found at autopsy that the ureter had diminished considerably in size. Post-mortem examinations have shown that we not infrequently have one kidney that has become more or less atrophied, that a moderate hydronephrosis is not unknown and that a pyelonephritis is a common way for these cases to terminate. Therefore, it seems to me essential that we in the future pay more attention to the care of the ureters than has been our custom.

It has been said, and I believe without justification, that we are perfectly safe in paying no attention to a ureter that we have cut in the removal of a bladder tumor, that it will take care of itself. I have found that this was not so in at

least one instance, the only case in which I have tested this hypothesis. In this patient I removed, using a cautery as a knife, a papillary mass perhaps as big as an olive that involved the region of the left ureter. The base was not infiltrated but in order to get a sufficient margin I cut across the mouth of the ureter. Following the teaching that it was perfectly safe to ignore a cut ureter, that it would take care of itself, if one did not close the incision in the bladder wall, I did nothing, as my patient's condition was not very good. After three or four months he began to have pain in his left kidney. I found that I could not pass even a fine bougie up that side. I cut down on the left ureter extraperitoneally, found it was considerably dilated, and that the man had a moderate retention of urine in the ureter and kidney pelvis. I reimplanted this ureter but the operation proved to be too much for this man's strength and he died a few days later. I want to stress the fact that the ureter must be resected whenever it is included in the area that it is necessary to remove to do a real surgical excision of a bladder tumor; also that it is unsafe to simply leave a ureter free in the depth of the wound; that it must be loosened sufficiently from its bed so that it can be brought down and fixed into the incision in the bladder; that if this cannot be done it may be necessary to make an extravesical incision, find the ureter, and reimplant it in some other portion of the bladder. The putting into the reimplanted ureter of a small, soft rubber catheter is, I believe, a great safeguard in these cases. Postoperative examination has proved that in a certain number of cases at least the ureter has been patent following this procedure; in the contraction of the scar of the bladder surface there seems to be a tendency to pull the mouth of the ureter open if it has been fixed to the mucosa, while in the only instance in which I took no care of the ureter, it became occluded. To me, the impossibility of safeguarding the patency of the ureters is a very serious objection to the use of radium or diathermy, instead of excision, in cases where a bladder tumor is removable.

It is not possible, however, in all cases of tumor of the bladder, to make a rational attempt at radical cure. Many have advanced so far that they are capable only of palliation. In some this is very evident; in others it is not. One does not want to take away any chance that a patient may have of cure by doing a palliative operation when a radical removal would be possible, yet on the other hand one does not want to attempt a radical operation when there is only a slight possibility of success. The patient who knows that he has an advanced tumor of the bladder will often be willing to take any operative risk rather than accept the inevitable, sometimes it has seemed to me with the idea that it probably meant euthanasia rather than cure; it is hard to refuse their appeal even when we know they ask the impossible.

Cases in which one finds the bladder one solid, indurated mass have in my experience been better off when left alone, provided there is no considerable retention.

Another type of case in which there is nothing to be gained by carrying out a radical operation, or a palliative one for that matter, is the type in which the patient complains of very severe pain referred to his leg or knee. This condition I have seen most often in patients who have shown a mass in a lateral wall of the bladder, which has directly invaded the tissues of the pelvis. I have likewise seen this where the original growth has not been on the lateral wall of the bladder but where there has been a metastatic involvement of the sacral and iliac lymph nodes, presumably with pressure on the nerve trunks. In cases of this sort there should rarely be an attempt made to do a radical operation since such disease as it is possible to remove will have little or no effect on the referred pain, nor can one

hope to get all the disease. The same applies to swelling of one leg; no operation upon the bladder will give relief.

In most instances of tumor of the bladder too far advanced to offer any prospect of removal, the patient's complaint is of frequency, pain, bleeding, and the malaise that comes from absorption from an infected bladder and interference with the renal function. The operation which commonly gives relief is cystotomy and drainage. If there is no considerable bladder distress, I think that these patients are probably quite as well off if left alone.

When it comes to drainage of the bladder on account of urinary distress or on account of severe hemorrhage or very foul urine, I think it is desirable to implant radium into the growth or treat it with a cautery, or to use fulguration or diathermy. I think all these methods probably slow up the growth and in most instances clear up the bladder surface to a certain degree. Then too the mental comfort that these things offer is often worth while. It has not been my experience, however, that we can expect cure in any but the rarest instances by these means. I look on them as solely palliative. It is perfectly true that in an occasional instance the degree of palliation is very great as in the case of a frail old gentleman of eighty whom I saw six years ago and in whom I implanted radium into a growth on the lateral wall of his bladder. The man's age and general condition were such that I thought any attempt at resection would be followed by a fatal result. This man died a month ago, having been comfortable for six years. According to his physician the immediate cause of his death was a cerebral hemorrhage. He had suffered no bladder discomfort from the time that he completed his convalescence from the implantation of the radium. There was no specimen of tissue removed in this operation and I cannot say definitely just what sort of growth it was. However, it had the typical appearance of an infiltrating growth and I should say it was probably a carcinoma of some type. It is the only instance of the sort that has come under my observation. When we find a definite involvement of bone, as one sometimes sees in the ilia or vertebrae, an attempt at anything but increased comfort through the use of sedatives is undesirable.

All patients from whom tumors of the bladder have been removed should be watched very carefully over a considerable period of time, even those who seem to be doing very well. A number of patients, particularly those whose growths are of the papillomatous type, show a tendency to recur which may often be kept in check for a long time by fulguration of the superficial growths as they reappear on the bladder surface. In one man there has been a recurrence of small superficial papillomas that have been taken care of by the use of fulguration over a period of ten years, in another for four years, and in a third case more than three and one-half years. One or two little recurrences in a patient whose primary growth was reported as carcinoma have been cleared up by fulguration.

In closing I wish to say that I think progress is being made in the treatment of tumors of the bladder but the men who are interested in this field do not as yet find themselves in the predicament of Alexander who was said to have wept because there was nothing left to conquer.

DISCUSSION

Dr. B. S. Barringer. Tonight Dr. Chute showed the extraordinary position we are in as regards bladder tumors. If bladder tumors were situated anywhere on the surface of the body where we could get at them instead of deep in a cavity, we could cure the majority of them. We must come down to the fact that it has been the surgical impossibilities encountered in dealing with this condition and not the life history of the growth which is at fault. Just what happens?

Dr. Chute says that one reason for failure has been that he has not gone wide of the growth; yet he has been operating on these growths for some years and probably at each

time making wider and wider excisions, and profiting by his failures in the past; yet to-day he says he does not get wide of the growth, and that complaint is heard to-day all over the country. It strikes me it is not the crux of the situation. I think the trouble is not that we do not get wide of the growth but in mobilizing the bladder before excision of the tumor the tumor is so traumatized that tumor cells are forced into the lymphatics.

When we radiate a tumor through the suprapubic incision, we simply open the bladder and disturb the tumor as little as possible. I believe that is one reason why operation has failed and radium is succeeding. I think I am more optimistic about the results of radium treatment of carcinoma of the bladder than most other carcinomas. I believe we can show 20 per cent of infiltrating carcinoma well for five years, and of papillary growths a larger percentage. In the suprapubic application of bladder tumors the operative mortality is very small. I have had an operative mortality of 3 per cent in nearly a hundred consecutive cases. That is a very small operative mortality. I don't believe the future lies in wider excision of bladder tumors or total cystectomy or transplantation of the ureters into the bowel but in devising some method other than operation for the control of these conditions,—and in radium we have, I believe, an ideal medium.

Dr. A. T. Osgood. I don't know that it is well to say in a meeting that you approve of methods which are considered palliative when there is some possibility of curing a patient by radical operation, but we see so many cases of tumor in which there is very little chance of radical cure by total cystectomy or anything else, that I am driven to employ the palliative measures in these cases. Only a few days ago I saw a case of an old man who had had no bleeding at all until three weeks before he came to me, yet his bladder was full of carcinoma. There had been no symptoms to give rise to suspicion that he had any trouble in his urinary tract. That is probably a hopeless case; he has a large carcinoma involving the vesical outlet and nothing should be done but apply some palliative, simple measures.

We all want these cases to come as early as possible and to treat them with the aim of cure. I feel that they are coming earlier now than they did a few years ago. I think the medical profession is more awake to the seriousness of hematuria, and that patients must be seen as soon as bleeding occurs. I think there are many encouraging features about our present procedures. Twenty years ago operations for tumors of the bladder were nearly all fatal; to-day, many of these patients are relieved, a few are cured apparently and carry on for many years in comfort after surgery and after some of the palliative methods of treatment. Many of these cases are very favorably affected by the use of radium with as little traumatism as possible, by the simplest method of exposing the tumor in such a way that it can be treated with radium. There is no doubt that this method gives a prolonged period of relief in a majority of the cases.

As for the multiple papillomata which may be malignant, I believe there are many which can be greatly helped. I have treated one patient for nine years, with recurring little papillomata. That patient probably would not have undergone operation in any easy fashion, but the condition has been controlled. I don't suppose it can be controlled for ten years more, but she has been comfortable and had very little disturbance. She simply comes for observation, and whenever there is found a papilloma it is simply and easily controlled.

I have another patient with recurrent tumor of the bladder. He underwent a serious experience with operation, before coming to me, consisting in wide excision of his primary tumor followed by secondary hemorrhage from which he nearly died and had transfusions with slow recovery. He will never submit to further operation and yet he has a recurrence. He has had no bleeding for a year; his tumor in the bladder is kept to the smallest possible size by fulguration which I think in this case the best available method. In some cases the simplest palliative measures afford a notable advance in our treatment of tumors of the bladder.

Dr. A. R. Stevens. I think the most hopeful sign in the general handling of carcinoma of the bladder is the perfect willingness of most operators and urologists to constantly change their points of view as new facts are brought forward. We do not hear quite so much of the two opposing schools advocating excision only or radium only; they seem to be getting a little closer together, and one finds more urologists who use a combination of the two methods.

Dr. Chute passed rather quickly over the question of handling the benign growths, and we are all willing to do that, as the handling of

such growths by cauterization with the high frequency current as advocated by Dr. Beer seems to fit the present needs very well, much better than any other form of treatment.

The great problem, of course, is carcinoma. It cannot be too often emphasized that our treatment is practically confined to the local growth. When it has passed on to other parts—to the glands or other organs—a cure, of course, is out of the question; but even in these cases one can do quite a good deal for the patient's comfort, as Dr. Chute has already mentioned, either by suprapubic drainage or, as we did some while back at Bellevue, by implanting the ureters into the sigmoid. I have in mind one case in which I opened up the peritoneum and found large iliac glands, and yet felt justified in going ahead and excising much of the bladder wall with a large growth which was easily reached. This stopped entirely the marked bleeding and pain. Of course the patient ultimately passed out, but was comfortable from that time on, had no pain nor urinary disturbance, and died of asthenia.

Our present attitude, which we are perfectly willing to alter from time to time, is that all malignant growths in the vault and lateral walls should be excised. In many of these cases, we implant radium in the bladder wall along the line of suture. Those that involve either ureteral orifice, we cauterize and then implant radium in the base of the growth.

Dr. J. F. McCarthy. If I had a case in court, a good cause of action, I would have Dr. Chute testify for me. He knows his facts. My experience with bladder tumors, to paraphrase Dr. Chute's title, has been that the happiest results have been with cystoscopic diathermy. In the operative field the best results I have had—and one was the first case I ever had at the Post-Graduate Hospital sixteen years ago and who is well today—have been by radical resection. In cases of the infiltrating type on the vesical floor with transvesical diathermy, I have been able to prolong the life of a considerable number in comparative comfort. In the cases where I have employed radium—and I have never done so except under the supervision of some one who was supposed to have a practical knowledge of the physics of radium—I have had 100 per cent casualties. I have, however, apparently cured some of these growths by this agent only to note rapid recurrence or precipitate metastases, and in a number of instances the course has been notable for pain and extreme discomfort.

Dr. Barringer has stated that he is opposed to resection, the principle objection being the manipulation of the bladder and the growth. I take the extreme opposite view. I cannot see how Dr. Barringer or any one can expose those growths through a median suprapubic incision so that he can with reasonable exactitude apply radium without considerable manipulation with retractors, etc. I do not take that viewpoint; I believe whether a bladder tumor be susceptible of resection or whether diathermy, or radium, or other physical means be employed, in order to carry out such procedure with any degree of precision, and it must be done with precision, that the bladder should be completely immobilized, else it is impossible for the operator to determine or have precise knowledge of the depth of the growth or its extent unless he is able to see both sides of the bladder, and unless he is able to palpate the bladder from without. I am convinced that radium can produce a certain change in these growths, but I cannot see how radium can be implanted with the precision to which it is entitled, unless the operator has complete vision and palpation of the growth. I believe that if we did more of these excisions of the bladder with the technique of "Squier" or "Beer" with a moderate degree of manipulation we would have better results. I believe, too, that we are reluctant to do cystectomy on these cases and am firmly convinced that cystectomy will become more popular and will give patients greater benefit with less torture, and will in many cases prolong life in comparative comfort.

Dr. Edwin Beer. There is no doubt, I believe, that there has been an enormous advance in the treatment of bladder tumors, both benign and malign. During my own period of activity I have seen these vast changes which Dr. Chute has referred to. Twenty-five years ago, when I used to work with Dr. Fluehrer, such a thing as a cure of an infiltrating carcinoma of the bladder was never even thought of. Even after exploratory operations, most of the patients succumbed in the hospital. That surely is not our present experience, even with the more extensive infiltrating growths. So that I feel that Dr. Chute is a little too pessimistic. I am much more hopeful. And as year follows year and our experience with the technique of the problems involved improves, I find that

we are getting better and better results. I would not be surprised that if Dr. Chute would review his last few years' work and compare it with his earlier work, he would also be less pessimistic.

In a word, we understand the disease much better, and we know much more about its treatment. The disease itself is a curious one. No one knows the cause of tumor formation in the mucosa of the bladder, and not knowing the cause, it is hard to understand why a patient can be treated for a papilloma and apparently cured, as controlled by cystoscopy over a period of three to four years, and then have the disease return as a fresh papilloma or papillary carcinoma in the bladder, in some new site. I have seen this occur so often that I feel convinced that there must be a vast biological difference underlying the condition of the mucosa in different patients. Until we have a better understanding of this variant, we cannot expect to master the question of recurrences or late new growths with any certainty.

To illustrate this peculiarity, let me mention a patient on whom I did a total cystectomy and prostatectomy and vesiculectomy for an infiltrating growth. The patient made a very satisfactory recovery, and lived for over five years with the ureters implanted in his skin. He had no symptoms of carcinosis, and died of some intercurrent disease. At autopsy, in the iliac glands numerous carcinoma cells were found. Here the carcinoma cells had apparently remained locally quiescent for a period of five years.

As far as the treatment of benign papillomata is concerned, there is no doubt in my mind that single or multiple growths can readily be destroyed with the high frequency treatment. But there is a definite group of cases with benign tumors where one is forced to do a suprapubic operation such as I have repeatedly described before the situation can be controlled. In those cases treated with high frequency current one will get a recurrence at the original site if the treatment is inadequate, and one may get a new tumor in another part of the bladder which has either been present at the time of the original examination and overlooked or which has grown on this biologically changed mucous membrane. All in all, one must expect from these two sources about 20 per cent recurrences. As all these patients can be easily controlled with high frequency currents, it is advisable to recystoscope them regularly. In the operative type of removal of tumors with the suprapubic operation, we apparently get even less recurrence, 85 per cent of the cases giving satisfactory results.

Similarly, with papillary carcinoma operated by complete extraperitonealization of the bladder, we are getting better and better results, with about 65 per cent to 70 per cent cures or apparent cures. When we come, however, to the infiltrating type the problem is totally different. Nobody knows how extensively the disease has developed; and no matter how wide the resection appears to be, tumor cells may be beyond the line of incision—which I may say in passing is now regularly made by me with the electric endotherm needle. It is interesting, however, to note that in the patients where the widest resections were done, *i.e.*, where the ureter orifice was excised and reimplanted (some 19 or 20 cases) the end results were even better than where it was deemed advisable to make a less extensive resection.

Another interesting point which came out in the study of our 450 plus cases is the fact that in four patients who had preoperative roentgen-ray treatment all have remained free from recurrence to date. Whether this preoperative roentgen-ray prevents our spreading the disease during the manipulations of the operation or not, is hard to say, though this was the thought underlying the use of preoperative roentgen-ray treatment. As far as the use of radium is concerned, I believe it has a definite field of application in solid tumors and papillary carcinomata in and about the neck, where anything short of a total cystectomy would fail to relieve the condition. Tumors in this site have repeatedly responded in my hands to treatment by radium seed implantation, and I am surprised to hear how many skeptics still exist as to the value of radium in the treatment of these infiltrating growths, as well as in the small papillary carcinomata which can be destroyed trans-cystoscopically by imbedding radium seeds.

Deep roentgen-ray treatment, in my work, on the other hand has been an absolute failure. It is most perplexing to read the reports from Baltimore and Chicago on the remarkably satisfactory results obtained. I have had at least six experts in this line of therapy treat patients for me who were troubled with bladder tumors, chiefly inoperable carcinoma, with uniformly negative results as far as cure is concerned.

In concluding, I would like to agree with Dr. Osgood that the medical profession is beginning to realize that the symptoms of pain and bleeding mean something serious and are referring patients earlier to the urologist. But I would like to go further and say that the urologist is making a serious mistake in holding patients for transcystoscopic fulguration too long after they realize (or should realize) that they are not able to effect a cure. Some of these patients have been treated for many months, even years, before I have seen them, and then they present themselves with incurable, or practically incurable, tumors of the bladder which can by no means be resected. If tumors do not respond to the high frequency treatment, if they recur and recur in situ, there is only one thing to do, and that is to operate. And the sooner the urologist appreciates that fact, the sooner he recognizes the limitations of the transcystoscopic method, the sooner our statistics will show better results.

Dr. Chute. Dr. Barringer thinks we often spread the malignant process by the trauma of operation. I believe this may be true at times. If, however, we did this commonly, as he suggests, why should not the recurrences be, as a rule, in the form of metastases. There can be no question that we have metastases but my recurrences following operation are for the most part local and many I think are due to overconservatism on my part in removing too small an area of bladder. If we are to cure these tumors we must get them out completely locally; I think that is the important thing.

I appreciate all that Dr. Barringer has done for the radium treatment of bladder tumors and his success with this treatment. There is one drawback to the use of radium and that is the impossibility of safeguarding the patency of the ureters. I am convinced that this shutting off of the ureters is a large factor in the fatal outcome in many cases of bladder tumors. In some cases where I have carried out a radical operation and in some patients dying of tumors of the bladder in which I have obtained autopsies I have found the ureters greatly dilated. I feel now that many of these people actually die of uremia, just like some of the prostatic cases where we have not taken sufficient care of the renal excretion. Because of our inability to safeguard the ureters when using radium I very much doubt whether radium can ever be considered other than a palliative treatment. I think that radium is of great advantage as a palliative agent and I use it constantly, not so much as Dr. Barringer does but I make a considerable use of it.

I agree with Dr. Osgood that cures from the operative treatment of tumors of the bladder have been relatively few in number, but as Dr. Barringer says we are getting more knowledge of the condition and our recent cases have shown better results than the earlier ones. I also agree with Dr. Stevens that we are all rather coming together and are beginning to appreciate that certain cases are susceptible only of palliative treatment, while others may with advantage be operated upon. As a purely palliative measure, I have been tempted to try the process that Dr. Stevens says they have used with satisfactory results at Bellevue, that of implanting the ureters into the intestines and then using radium through a suprapubic fistula. As yet I have not had the courage to do it.

It pleased me to hear Dr. McCarthy say that he believed in resection in cases of bladder tumor and that he had a patient who had been well for sixteen years following such an operation. That is superior to anything in the way of results that I have had.

Dr. Beer may very well say that he has noticed a great advance in the treatment of bladder tumors since he first became interested in it, and I may add a large proportion is due to his work in fulguration. We all appreciate the additions he has made to it. His case of cystectomy, showing disease which was evidently dormant for five years, is interesting and a trifle discouraging, I admit. His alcohol and cautery treatment to prevent local implantations of tumor cells I almost always use, but even in spite of it I see at times recurrences in my suprapubic incisions which I believe must be due to implantations; the recurrences that occur locally I have been inclined to ascribe to a too limited removal of the growth. I think we will all agree with his statement that there are still many unsolved problems in the treatment of bladder tumors and we still have a lot of work to do. I am glad to hear the men say that they believe they are having their cases of bladder tumors referred earlier. I have felt rather discouraged on this score.

IMMUNOLOGICAL METHOD IN HODGKIN'S DISEASE

A PRELIMINARY REPORT

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WE venture to submit a method for the treatment of Hodgkin's disease based upon immunological concepts. The experimental work includes 5 well defined cases of the disease, 3 of which are reported at this time. The work extended over a period of two years.

The procedure consisted essentially in the use of autogenous, bacteria-free extracts made from the specific lesions of the disease. This extract was given in small and usually increasing doses, subcutaneously. The treatment period extended over several months in each case. No other treatment was given, excepting general hygienic direction, as noted in the case histories.

Feeling that in any case the roentgen-ray treatment which these patients were receiving could have but temporary effect at best, the exact nature and gravity of the situation was explained to each of them and their permission for treatment unassisted by the roentgen ray was obtained. The results then may be interpreted as due either to a series of remarkable coincidences or to the effects of the single therapeutic procedure.

In the past two immunological methods have been used, both of them, however, in conjunction with roentgen-ray therapy. Billings and Rosenow used bacterial vaccines prepared from killed organisms isolated from the specific lesions. Lortat-Jacob, Schmite and Le Rasle employed the serum of a patient following intensive radiation. Both groups of investigators felt that the effect of the roentgen ray was materially enhanced by the immunological therapy. These results are difficult to evaluate from an immunological standpoint because of the inclusion of roentgen-ray therapy, but the results are most suggestive, because they give an experimental foundation to the concept that Hodgkin's disease will respond, to some degree at least, to immunological methods of attack whether the nature of the reaction be specific or not.

The use of autogenous extracts as carried out in our cases is based upon the premise that the disease is of toxic origin and that the organisms, described by Bunting and Yates, Billings and Rosenow and others, contribute secondarily to the disease picture. It is not our purpose to contend that the reactions observed in this series are of a specific nature. It is our belief that the specific lesions of Hodgkin's disease contain certain amounts of a toxin which, when injected in small doses into the unaffected tissues, stimulates the production of antibodies; and that it is the resulting removal of the etiological factor which arrests the pathological process and permits a return to the normal. We are not prepared to make an issue of this point, however, and wish to rest with a description of the procedure and the results obtained.

No particular selection of cases was made, but the diagnosis of Hodgkin's disease was in every case confirmed by others. Longcope's comprehensive description was used for the histological diagnosis.

Treatment was given in 5 cases of Hodgkin's disease with improvement in all, and with complete disappearance of all clinical symptoms in 2. Six months after beginning treatment 1 case died. In this case death was due to a transverse myelitis, and caries of several vertebrae, the autopsy showing complete disappearance of all lesions of Hodgkin's disease other

than the necrosis of bone; 1 case is being held for future reporting as it is incomplete at this date; 3 cases of lymphosarcoma and 1 case lymphatic leucemia were also attempted, but without success.

The extracts were made as follows: Using aseptic technique, one or more nodes were removed. This tissue was at once placed in warm sterile saline, and washed free of blood. This mass was weighed, finely comminuted by means of a razor, ground for five minutes in a sterile mortar, washed with a little warm sterile saline, and placed in a sterile thick-walled bottle* containing finely broken glass particles and beads. The mass was then shaken mechanically for two hours. The object of this comminution was to obtain the cellular and toxic material in as near the living state as possible. It was then washed with sterile saline into a small Seitz filter, and the filtrate obtained by suction. This filtrate was made up to volume with sterile saline, so that 10 c.c. of saline were allowed for each gram of original substance taken, thus giving a rough index of concentration. The completed extract or filtrate was placed in small rubber stoppered vials, and kept at ice box temperature.

The greatest care must be used to maintain the sterility of the finished product. We used no preservative, but intend to try tricresol.

The extract was given subcutaneously, preferably selecting a point distal to the more prominent lesions. The dosage was begun with 0.1 c.c. and increased 0.1 c.c. every other day, or as the injections were given. We found that this could not be increased beyond a certain point without appreciably increasing the cachexia. It was ultimately decided to set the limit at 0.5 c.c. Individual cases will be found to vary so widely in their resistance to the toxic effects of an overdose that it is most difficult to set a definite limit for all cases. No general reaction was sought for, and we avoided such an effect as far as possible. In F., Case II, the dose was increased much too high, with the result that we had marked constitutional symptoms of nausea, vomiting, temperature and asthenia. Another case, P., Case I, could stand very large doses without any unfavorable reaction. In some cases it was necessary to prepare a second extract as the original one became badly contaminated or was insufficient in quantity.

The selection of the node or mass to be used is believed to be of importance. Hard, dense nodes should not be taken. It is preferable to use the more cellular, fresher and larger masses.

Generally speaking, the first absolute sign of improvement was seen in the specific lesions, which became softer and much smaller in size. The temperature gradually fell until constant normals were maintained. General symptoms, such as nausea, vomiting, dyspnea and asthenia were relieved usually in one or two weeks.

Bacteriological examination of the excised nodes gave variable results, Staphylococcus albus, diphtheroid bacilli and a Gram-negative bacillus being found principally. We attempted no etiological studies with any of these.

* A small infant's milk bottle is suitable.

CASE REPORTS

Case I. P., Dr. Whitehead. Male, white, aged forty, married, past history negative. Diagnosis: Hodgkin's disease. Marked generalized lymphadenopathy, especially of neck and axillae. Cachexia very marked, with severe dyspnea, typical Pel-Ebstein temperature, moderate anemia, occasional chills, some nausea and anorrhexia, several carious teeth. Confined to bed. Skin color, waxen yellowish; Wassermann negative; blood counts showed slight secondary anemia and a fluctuating white count.

Roentgen-ray photograph of chest showed a large, dense central shadow, fading a little at the edges, and occupying an area about twice the size of the heart, and extending upward toward the neck. There was no evidence of involvement of bone.

Biopsy taken from neck showed well defined Hodgkin's disease. The clinical diagnosis was confirmed by several members of the Staff of the Methodist Hospital, Indianapolis.

Treatment was begun after making an extract as above described. The patient

showed definite clinical improvement after the second dose. The dyspnea, which was severe, gradually but definitely decreased and the enlarged nodes became much smaller. The irregular temperature returned to normal with only an occasional rise. One month after beginning treatment the patient was able to leave his bed and general improvement was gradual and continuous.

Before the enlarged nodes entirely disappeared, a fresh extract was made from a small mass in the axilla. This was used until the completion of the treatment.

General hygienic measures were instituted early in the course. Liver and cod-liver oil were given internally and, as several teeth were carious, all were removed in three sittings. The patient was exposed to sunlight whenever possible and every effort was made to improve physical resistance.

A roentgen-ray plate of the thorax showed a very dense shadow in the mediastinum, sharply outlined and much smaller than that seen in the first picture taken. This photograph was taken six months after the beginning of treatment.

Two years have elapsed since this patient came under our observation, and eighteen months since his discharge from hospital. During this time (eighteen months) he has been entirely free from symptoms and nodular enlargement, has gained 17 lbs. in weight and is apparently well. He has returned to work, which is hard manual labor.

Conclusions, Case I. There was rapid clinical improvement in this case of Hodgkin's disease following the administration of small, gradually increasing doses of an extract made from one of the enlarged nodes. This improvement progressed, and has reached a point at which the man is entirely free of the signs and symptoms of Hodgkin's disease. He has remained well for eighteen months and is able to perform hard manual labor daily.

Case II. F., Dr. Whitehead. Male, white, aged thirty-five, past history negative. Diagnosis: Hodgkin's disease. Marked enlargement of left side of neck and left axilla; some nodes in right supraclavicular space; cachexia moderate. Ambulatory most of the time; irregular attacks of severe nausea, vomiting, temperature and chills. Skin color, yellowish, pale. Anemia moderate. Blood picture showed slight leucopenia.

No roentgen ray was used in this case, not even for photographic purposes.

Biopsy taken from neck showed well defined Hodgkin's disease. This case had been previously diagnosed by physicians of the U. S. Veterans' Bureau and the U. S. Navy as Hodgkin's disease.

The treatment was prepared and carried out as previously described. The patient began to improve noticeably in one week following the first injection of 0.1 c.c. of the extract. Nausea and vomiting ceased, his appetite returned and the enlargements in the neck and axilla became smaller and softer.

An attempt was made to determine the toxicity of the extract by increasing the dose steadily, but at 0.6 c.c. he suddenly ran a temperature of 101°F., with nausea, vomiting and marked asthenia. The treatment was discontinued for one week, after which it was resumed in 0.3 c.c. amounts. This he tolerated well and improved steadily. Two months later a second attempt to increase the dose brought an equally severe relapse as was noted before. The treatment was discontinued for one week and resumed again. He gained weight steadily and finally went back to work, hard manual labor, after a treatment period of six months. It became difficult to control his visits after he was apparently well and finally his visits to the hospital were voluntarily discontinued. He was well for six months, working daily and receiving no treatment.

The patient then suffered a severe relapse with a generalized lymphadenopathy, temperature and abdominal distress. A mass was again excised and treatment begun all over again. Improvement was observed at once, more rapidly even than did the original state, the acute symptoms and nodular enlargements disappearing entirely within about two months. He gained weight steadily, improved generally and at present shows no palpable nodes. At the beginning of the second treatment period he weighed 112 pounds. His present weight, seven months later, is 148 pounds.

Conclusions, Case II. There was steady clinical improvement in a case of Hodgkin's disease following the administration of small, gradually increasing doses of an extract made from one of the enlarged nodular masses. Duplication of the clinical symptoms could be accomplished by an overdose of this extract. A relapse was easily controlled by the plan of

treatment. The patient has been symptom-free for six months following the relapse, and for six months prior to the relapse.

Case III. F., Dr. L. M. Robrock. Treated by Dr. Robrock at the Vancouver General Hospital, Vancouver, B.C., Canada. Female, aged forty years, white, married, past history negative. Diagnosis: Hodgkin's disease, made from biopsy by Dr. Pitts, Pathologist to the Vancouver General Hospital, and confirmed by Dr. William Boyd, Professor of Pathology, University of Manitoba.

Numerous roentgen-ray treatments had been given but without more than temporary effect. When this patient came under Dr. Robrock's observation, she was semi-conscious, with marked dyspnea, cachexia, irregular Pel-Ebstein temperature, and widespread and very marked lymphadenopathy. She also had a kyphosis due to caries of the third and fourth thoracic and the fifth cervical vertebrae. As this involvement of bone is of great importance, it will be discussed in more detail later. It was believed by the clinical staff and by Dr. Robrock that the patient was in extremis at the time treatment was begun.

A mass was excised and an extract made. This extract was made by simply comminuting the tissue in a sterile mortar using a small amount of saline. The extract was passed through a Berkefeld filter, subcultured for sterility and injected. In all, eleven injections were given over a period of three weeks.

After ten days, general improvement was noted. The enlarged glands greatly decreased in size. The dyspnea was relieved and the patient became fully conscious. Three weeks after beginning treatment she showed almost no glandular enlargements and one week later none could be found. Gain in weight was steady. Four weeks after beginning treatment, it was felt that a new extract was necessary, but careful search for nodes did not disclose any. At this time, the vertebral involvement was causing considerable trouble and a cast and brace were applied.

The subsequent course of the illness was entirely free of any suggestion of Hodgkin's disease, but became one showing every evidence of transverse myelitis. Paraplegia and paralytic ileus were outstanding. The patient went into a gradual decline and died six months after the beginning of the treatment for Hodgkin's disease.

An autopsy by Dr. Pitts showed no demonstrable evidence of Hodgkin's disease. There were marked caries of the vertebrae above mentioned, with a transverse myelitis of the spinal cord. No evidence of Hodgkin's disease could be found in liver, spleen, abdominal or thoracic lymph nodes.

Conclusions, Case III. This case is most instructive on account of the prompt and evidently complete response of the Hodgkin's disease and the continuation to a fatal termination by the bone and spinal cord lesions. We are compelled to acknowledge the impossibility of complete success in the presence of organic destruction of vital areas and tissues whether by Hodgkin's disease or by other pathological processes. This particularly applies to such tissues as the central nervous and osseous systems.

The 3 cases of lymphosarcoma which were tried by this method, after variable periods of temporary improvement, all ended fatally. In 2 of these, the decrease in size of the nodular enlargements was sufficient to offer encouragement, but after reaching a certain point of regression the neoplastic process appeared to take on increased activity and death resulted shortly after. These results are possibly parallel with those of Ill and Minningham, Hodenpyl and others, who used ascitic fluid from abdominal malignancies. These writers also noted temporary improvement which was followed by renewed activity and death.

The 1 case of chronic lymphatic leucemia resulted in death one week after beginning treatment. This is in accord with the belief that this disease should not receive surgical interference and is reported for that reason.

SUMMARY

Our findings are summarized as follows:

1. Certain cases of Hodgkin's disease may be treated with an autogenous glandular extract with a hope of good clinical results, without the use of roentgen ray.

2. The first effect noted was softening and recession of the enlarged nodes. This progressed steadily, leaving only fibrous nodules, which were hardly palpable and which also disappeared after several months.

3. The cachexia was gradually but definitely reduced, finally disappearing entirely. Symptoms, such as nausea, vomiting, urinary retention, anorrhexia and asthenia were relieved. The temperature reached the normal more slowly. Gain in weight was striking in 2 cases.

4. In carrying out the treatment, certain points require emphasis:

a. Bacterial contamination must be carefully avoided. If a marked precipitate appears after keeping for some time, it is best to make a fresh extract. To avoid contamination, it is best to keep the extract in several small vials.

b. The selection of suitable nodular masses for excision is important. The mass should not be old, hard and fibrous. Actively growing tissue is the best for the purpose. As large a mass as possible should be taken.

c. Injections should be given every other day until definite improvement is noted. The interval may be then increased to weekly injections, for three or more months. The best results were obtained when the dose was kept well below the toxic amount, and when the injections were given regularly over a prolonged period of time.

d. An occasional rest period of one or two weeks is sometimes helpful. This may be advised after the first six weeks of treatment.

e. General hygienic measures should be instituted, and foci of infection must be removed or treated. This is best undertaken after the cachexia is definitely improved.

f. The treatment gives satisfactory results in uncomplicated cases. Those with active tuberculosis, marked bone involvement, spinal cord lesions, or any other grave constitutional malady present a problem not yet worked out.

CONCLUSIONS

In reviewing the conclusions drawn from these cases certain parallel reactions may be noted. While the number of cases is small and therefore limits the experimental data to possibilities, these notations may be considered as starting points for future work by others. Our experience with the 3 cases of lymphosarcoma indicates that this method is of no avail and we have stopped using it on this neoplasm.

Cases of Hodgkin's disease, on the other hand, seem to have been definitely helped but the ultimate value of the treatment will depend on the future and observation on a large number of cases.

We feel that this method presents certain possibilities in the treatment of Hodgkin's disease, although a five year observation period will be necessary before any positive assertions may be made. The results to date offer encouragement for continued trial of the method.

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MULTIPLE ADENOMAS OF COLON (POLYPOSIS)*

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BROOKLYN

THE determination of the cause of blood in the stools is one of the most difficult problems that ever confronts the physician. I shall discuss only one phase of it namely, multiple adenomas, often incorrectly called polyposis because many of the tumors are not pedunculated. Adenomas constitute 58 per cent of the benign tumors and nearly 100 per cent of the disseminated tumors of the gastro-intestinal tract.

In 1721 Menzel described a case in which there was a general inflammation of the intestinal tract and a number of wart-like excrescences in the colon.

Wagner in 1832 and Rokitansky in 1839 described the method of formation of the polypi from the mucosa surrounding the ulcers. In 1861 Luschka described a colon containing thousands of polyps from the ileocecal valve to the anus and varying in size from a hempseed to a bean. They consisted of glands resembling those of Liberkühn. Virchow in 1863 described a case and called it "Colitis Polyposa Cystica." Cripps in 1882 described three cases occurring in the same family (brothers). He concluded that the multiple disseminated variety is extremely rare; that it seems most common in early youth; has a definite familial tendency and is, probably, related to cancer. Niemack also reports the case of a girl aged twelve with familial tendency and Pennant reported three cases in one family. The literature of this subject bears such well-known names as: Murphy, Lockhart-Mummery, Erdmann, Morris, Gant and Coffey. The simplest classification is that of Erdmann and Morris,[3] namely:

1. Adolescent (congenital, disseminated) type.
2. Adult (acquired) type.

The *adolescent* type usually commences in the first decade but frequently is not seen by the physician until the second decade when a history of repeated hemorrhages for some years is obtained. It has frequently occurred in several members of the same family and the mucosa of the gut is thickly and uniformly studded with multiple adenomatous polyps from the ileocecal valve to the anus. The diagnosis of this type may be definitely established or rejected by sigmoidoscopy.

Of the second or *adult* type more than half occur in males from sixteen to thirty years old and it is probably always the result of infection in some form, although Murphy in 1916 said: "The etiology of intestinal polypi, like that of the common wart, is shrouded in mystery: Whence they come and why they go is like the riddle of the sphinx." The polypi are fewer in number and may be limited to certain regions of the colon while there may be none in the rectum, hence a negative sigmoidoscopy is of no diagnostic value. Ulcers may be present in this type.

PATHOLOGY

As the result of irritation or infection in a susceptible individual there occurs a diffuse hyperplasia of the glands and stroma of the intestinal mucosa with lymphocytic infiltration and the formation of new blood and lymph vessels. A local thickening occurs which gradually enlarges and in many places, as a result of the mechanical traction and squeezing, first sessile and later pedunculated tumors are formed. These are never confined to the small gut. They are usually limited to the colon. They vary in size from a pin head to a pear and hundreds may be present. The well developed ones are true adenomas.

*Read before Ex-Interne Society, Methodist-Episcopal Hospital, May 24 1928.

The surface may be smooth, or rough and nodular, like a cauliflower. In the acquired variety the intervening areas of mucosa may be ulcerated.

Within a period of from one to seven years a majority of these adenomas degenerate into adenocarcinomas. Coffey says: "There is probably no benign process in which there is a higher incidence of malignancy than colonic polyposis." Soper's series shows an incidence of 43 per cent.

ETIOLOGY

In the adolescent type we must assume an unusually sensitive mucosa which is easily irritated and inflamed by even normal intestinal contents. Tuberculosis, syphilis, amebic or bacillary dysentery and other inflammations of the colon, mechanical or medicinal irritants and even parasites are recognized causes of polyposis.

SYMPTOMS

Hemorrhage into the lumen of the bowel is the one symptom present in every case sooner or later. It may be microscopic in amount or profuse and dark or bright in color. "The adenomas secrete an abundant, thick, offensive, glairy, irritating discharge that incites tenesmus and frequent evacuations unrelieved by defecation."[4] Marked anemia and weakness eventually supervene. Pain due to enterospasm is present.

Eberhard, before the Kings County Medical Society, reported the case of a man forty years of age who had sudden attacks of umbilical pain. The diagnosis of multiple adenomas was finally made by sigmoidoscope.

Intussusception, procidentia recti or intestinal obstruction may develop in the late cases, either previous to or associated with the adenocarcinoma that will finally appear in practically every case.

TREATMENT

The treatment of multiple adenomas or polyposis is colectomy. Whether this should be done at one operation or in multiple stages must depend upon the condition of the patient and the skill of the operator. A two or three stage operation would seem advisable in most cases. This alone can avert the onset of malignant degeneration.

How dangerous is a colectomy? Here again the answer depends upon the condition of the patient and the skill of the operator. It is not an operation to be lightly undertaken and will always have an appreciable mortality.

Clark of Philadelphia[6] has reported 12 colectomies for extreme constipation without any primary operative death. That there is danger of the formation of generalized peritoneal adhesions as a sequel of colectomy must be admitted. In Clark's 12 cases peritoneal adhesions caused one death four months after operation and necessitated a second operation in two other cases.

What are the end results in polypoid disease? Lilienthal[5] presented a case to the New York Surgical Society twelve years after a total colectomy for multiple papillomas of the colon. His patient, a woman, was in excellent general health.

In the case about to be reported many adhesions were found at the last operation. They may cause more trouble later. In addition there is the danger of recurrence of the malignancy in metastatic form.

CASE REPORT

The patient was a female, thirty-three years of age. Hospital number 122,423. Family history, irrelevant. Past history: She had typhoid fever when she was a child. Patient took up nursing at the age of seventeen years. She was then in excellent health and weighed about 125 pounds.

Present illness. In the spring of 1916 she weighed 125 pounds and was employed as a graduate nurse at the Women's Hospital. The duty was arduous and she began to lose weight, had gastrointestinal upsets, fermentation of food and occasional attacks of diarrhea.

She was married October 31, 1918. Her weight at that time was 106 pounds. There were no

other symptoms except a general physical reduction and eructations. The living conditions were excellent but there was little or no gain in weight. In August 1920, she suffered from an attack of dysentery with 6 or 7 bloody stools a day. This illness lasted six weeks. There was then a gradual improvement.

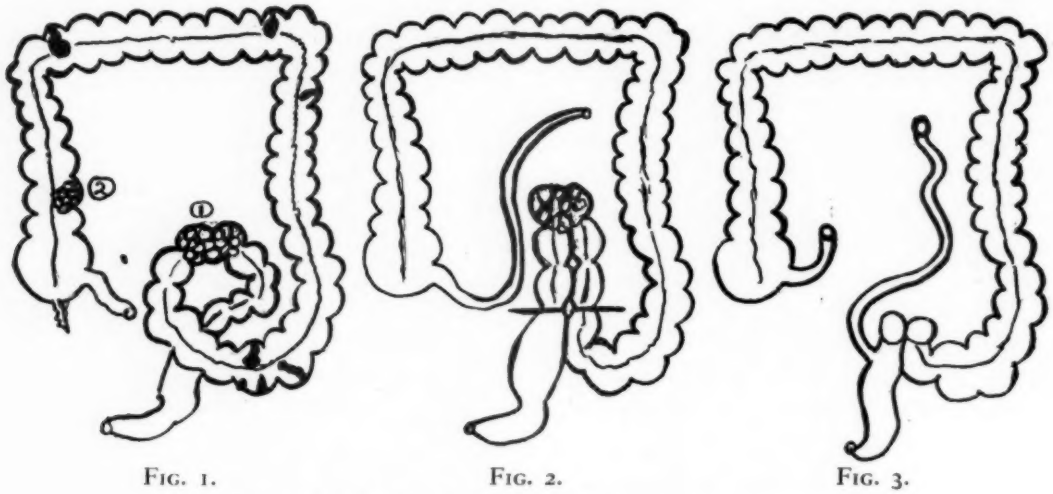

Fig. 1. Fig. 2. Fig. 3.

Fig. 1. Condition before operation.
Fig. 2. Appendectomy; first stage of Mikulicz operation.
Fig. 3. Ileo proctostomy and ileostomy; colon isolated.

During the early part of February 1922, she passed a little bright blood. A physician thought it was due to hemorrhoids or fissure. February 20, 1922, following a vaginal examination, she complained of severe headache, had a chill and her temperature rose to 103°F. Two days later an abortion occurred at approximately one month. There was no infection. Following this she again improved somewhat but her weight remained between 106 and 110 pounds.

During the winter of 1923–1924 she occasionally passed a little bright blood with the stools. After an examination February 12, 1924, by a surgeon, a tentative diagnosis of tuberculous colitis was made and irrigations of silver nitrate solution were ordered. Later she was found to have a small internal hemorrhoid.

During the summer of 1924 there was considerable improvement. She no longer passed any blood. Her weight increased to 112 pounds and she became pregnant. During the early months of her pregnancy she often complained of intestinal cramps and pain in the back. In December, 1924, a blood count showed only 3,500,000 red cells and 45 per cent hemoglobin. A diagnosis of secondary anemia was made. No nucleated red cells were found in the smear and the color index was not high. Injections of iron and arsenic were given. During the pregnancy her weight increased from 112 to 124 pounds, but, on several occasions, she suffered from severe chills followed by a temperature of 103°F. to 104°F. A smear made at this time was negative for malaria.

On May 22, 1924, she gave birth to a female child weighing six pounds and six ounces. This child has been well since birth. She was nursed for five months and then weaned because the mother was again becoming anemic. A specimen of stool at this time showed B. coli and streptococci at a pretty high level and B. welchii about 50 less than the average number.

January 20, 1925, red cells 3,300,000 and hemoglobin 40 per cent.

February 17, 1925, red cells 3,300,000 and hemoglobin 40 per cent; leucocytes 11,600 with 82 per cent polynuclears.

May 20, 1925, red cells 3,866,000; hemoglobin 62 per cent; leucocytes 11,600; polynuclears 75 per cent.

October 1925, again a diminution was present. Red cells 3,000,000; hemoglobin 50 per cent; leucocytes 4,800 and 52 per cent polynuclears.

These five counts were all made by Doctor Dexter. In some of the specimens poikilocytosis was marked. No nucleated cells were found at any time, that is, no normoblasts.

Occasionally she would suffer from attacks of sore throat with various vague pains and aches.

Such attacks lasted only a day or two. The tonsils were found to be diseased and during the latter part of June, 1926, were removed under a local anesthetic. At infrequent intervals she would pass a little bright red blood from the rectum. The blood count remained about the same; hemoglobin 52 per cent and red cells 3,500,000.

In August she suffered from a chill with a temperature of 103°F. and a pulse of 120. After a day or two she felt quite well again. Following childbirth her weight remained around 112 pounds. During the winter of 1926–1927 she was fairly well, but not particularly strong. In the spring of 1927, following a period of worry over severe disappointment, she ate poorly, became quite reduced and again suffered from a chill and fever.

Five weeks in the mountains produced considerable improvement, although she had another chill at the end of the first week. Two weeks after her return home she had another severe chill with a temperature of 102°F. and a pulse of 120. The following day she felt quite well and was able to go out. Three weeks later there was a similar occurrence.

September 17, 1927, the leucocytes were 7,400; hemoglobin 48 per cent and the polynuclears 66 per cent. She eats very well and is of an optimistic temperament, but is worrying a great deal about her condition, especially of late not having menstruated for two months. On October 3, she suffered from a slight chill followed, as usual, by a temperature of 102°F. and a rapid pulse. For several years past she has, at intervals, complained of intestinal cramps, has passed a great deal of flatus and has had eructations. For the past three or four years her stools have been more numerous than normal, usually 3 or 4 a day and, at times, even as many as 6 or 8 a day. The appearance was often like "sausage meat" and mucus and blood were almost invariably present.

An examination of the feces on October 10, 1927, showed the following: The appearance was brown and extremely gaseous. It was highly acid to all indicators. Test for bile was negative; hydrobilirubin, positive; histamin, xxxx; bacteria producing sulphuretted hydrogen, oxalic acid, acetone and formaldehyde, negative. Microscopic examination showed a moderate amount of cellulose; large numbers of red cells; no ova or parasites; bacteria, Gram-negative, 90 per cent. Indol was present and a large amount of mucus; blood pigment was xxxx. Negative for pus. On the outside of the fecal mass in the jar were many blood cells and mucus in large amount.

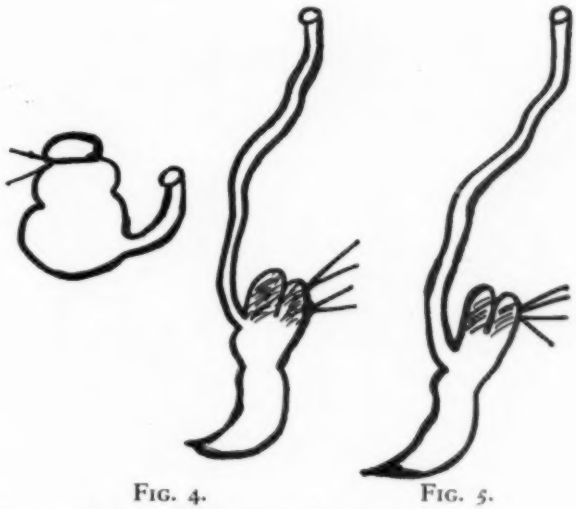

Fig. 4. Fig. 5.

Fig. 4. Most of colon removed.
Fig. 5. Colon entirely removed; ileum ending in the rectum.

On October 14, 1927 a roentgen-ray examination was made by Dr. Quimby at the N. Y. Polyclinic Hospital. It showed 1/10 of the meal in the stomach at the end of six hours and the greater portion in the coils of jejunum, principally in the right lower quadrant. At fifty-six hours the barium was in the appendix and down to the rectum. The entire colon was moderately dilated. There was no evidence of a growth or of polypi.

On November 10, 1927, Dr. Lynch removed a specimen through the sigmoidoscope and the report by Dr. Joseph Felsen was as follows:

"The specimen submitted for examination consists of a soft, solid, pinkish, oval mass 1.8 cm. by 1 cm. in size, somewhat knobby but smooth on the surface. It appears to have been avulsed from it's original attachment. Upon section the tissue is of a homogeneous, smooth, pinkish texture. Microscopic diagnosis: Papillary adenoma. The stroma is highly vascularized with large and small thin-walled vessels and is infiltrated with cells of the lymphoid type. The general microscopic appearance is very suggestive of a chronic irritative process."

Dr. Lynch at this time made a diagnosis of multiple polyposis of the colon.

Shortly after this the writer did a sigmoidoscopy which showed a few small internal hemorrhoids and a few areas of scar tissue in the rectum. No polypi or ulcers were seen in the rectum or lower sigmoid.

November 11, 14, and 18 small injections of quinine and urea hydrochloride were given into the hemorrhoids but without cessation of the

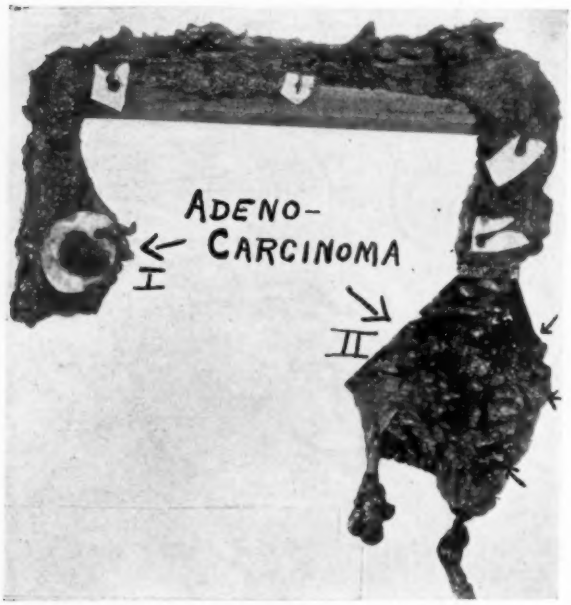

Fig. 6. Colon and sigmoid composite photograph.

blood in the stools. On November 30, 1927, the patient was sent to the hospital for operation. Her red cells, at this time, were 4,184,000, the white cells were 6,800 and the hemoglobin was 30 per cent.

During the course of her illness, up to this time, she had been in the care of 15 physicians, including the writer, and had received various diagnoses such as secondary anemia from an unknown focal infection, hemorrhoids, fissure in ano, tuberculous colitis, old tuberculosis of the lungs, and polyposis of the colon. These facts are mentioned merely to show the difficulty of diagnosis in these cases.

Physical examination at this time showed a well developed and fairly well nourished adult female. The skin was pallid and the mucous membranes were blanched. The heart and lungs were normal. The abdomen was soft and not distended and no masses were palpable.

For about two months prior to admission the patient had noticed a tendency to constipation instead of diarrhea. This assumed considerable importance later when considering the findings at the first operation.

In view of the marked anemia and long standing disease a series of operations was found necessary.

Operation No. 1. December 1, 1927. Appendectomy. First stage of Mikulicz operation on sigmoid. Through a McBurney incision on the right side with sufficient enlargement down the border of the rectus to admit a hand the appendix was removed and the abdomen explored. A large mass was found in the sigmoid. The original incision was closed and a second similar muscle splitting incision made in the left lower quadrant near to the anterior superior spine. The sigmoid loop with the mass at its center was drawn out through the wound and the two limbs sutured together and the parietal peritoneum sutured to the base of the loop. Time of operation one hour and five minutes. The patient stood the operation well.

Operation No. 2. December 2, 1927. Transfusion. Blood, 560 c.c., was given by the Unger method to hasten convalescence. The red cells following this were 4,776,000 and the hemoglobin 54 per cent.

Operation No. 3. December 10, 1927. Removal of sigmoid. Pathological report: The specimen consists of a rough, irregular mass of tissue 14 × 13 × 8 cm. in size. It is largely composed of firm, friable gray tissue. Here and there are polypi adherent to the wall by a pedicle. These vary from ½ to 2 inches in length. Microscopic examination by Dr. Smith: This is a colitis polyposa which has developed into an adenocarcinoma.

After the sigmoid loop had been removed several polypi were seen dropping down into the upper opening of the colostomy. One of these was tied off and removed. A microscopic examination of this showed a marked adenomatous hyperplasia of the intestinal glands. In a few places there was a tendency toward carcinomatous growth.

By December 23, 1927, the red cells had risen to 4,496,000; the hemoglobin was 59 per cent; white cells 7,050 and the polynuclears 72 per cent.

The urine, on a few ocasions while in the hospital, showed a faint trace of albumen and several times showed pus cells but neither of these was constant.

We felt that the improvement could only be temporary as long as there were more polypi present in the colon so a colectomy seemed imperative. The patient's general condition and morale were excellent throughout. All her wounds healed nicely without infection up to this time.

Operation No. 4. December 31, 1927. Transfusion. Ileoproctostomy. Blood 160 c.c., was given by the Unger method. The terminal

ileum was then divided about 6 inches from the ileocecal valve and the proximal end implanted into the side of the rectum about 6 inches below the abdominal wall by a Murphy button anastomosis because of the tension and fixation of the rectum. The distal end of the ileum was then fastened into the upper end of the right rectus incision which had been used for this operation. The skin was lightly attached to the peritoneum of the ileum. Time of operation one hour and ten minutes. Technically this was a difficult operation.

Again the patient responded well. There was no shock and primary union resulted. On January 21, 1928, the patient had a normal red cell count and hemoglobin of 77 per cent. She had an isolated colon free from fecal irritation with an ileostomy on one end and a colostomy on the other. Her feces were somewhat fluid and at night, especially, ran back and out through the colostomy wound. She was permitted to leave the hospital and return home to recuperate before the colectomy. She gained 15 pounds in weight and returned to the hospital in perfect health. While at home she had several hemorrhages from the colon. One was quite profuse.

Operation No. 5. March 5, 1928. Closure of colostomy and colectomy. A circular incision was made around the colostomy and deepened until both limbs were thoroughly loosened from the surrounding structures. Heavy silk ligatures were then tied around both ends and the mesenteric septum that united them was divided. Both ends were then sterilized by the actual cautery. The rectal end was then inverted by two purse string sutures of chromic gut and attached to the parietal peritoneum. The oral end was then pushed within the peritoneal cavity and the intermuscular incision was closed in layers with a small tube to the closed end of the rectum. Next a 7 inch upper left rectus incision was made. The outer leaf of the mesocolon was split, the mesocolon was clamped, ligated and cut and the entire descending colon, transverse colon, and nearly all of the ascending colon removed to a point just above the cecum. The omentum was left behind attached to the stomach. The wound was sutured in layers with chromic gut. Time of operation two hours.

As usual the patient responded well and had no postoperative shock although her pulse went up to 120 and took several days to return again to normal and she appeared more tired out than after the previous operations. Primary union occurred in both wounds.

Pathological report: The specimen consists of most of the colon commencing above the cecal pouch and ending at the sigmoid. When split longitudinally it shows scattered throughout it's entire length numerous small projections. Some are minute and conical in shape, others are 3 cm. or more in length, are pedunculated and have either a hard irregular adenomatous appearance and feeling or are smooth soft polypi. At the cecal end of the specimen is a large hard irregular mass about 4 cm. in diameter, raised up with a cauliflower appearance and feeling, very evidently an adenocarcinoma.

Microscopic examination: Adenocarcinoma.

Operation No. 6. March 19, 1928. Removal of terminal ileum and cecum. An incision was made in the scar of the previous right rectus operation encircling the ileum. This was deepened until the peritoneum was opened and the entire end of the ileum freed from the surrounding tissues. The cecum was then mobilized at it's lower end and gradually loosened up toward the upper end. At the site of the previous division the adhesions were very dense and the lines of cleavage were obliterated. There were omental adhesions and adhesions of the small intestine to the abdominal wall and to adjacent coils. Good exposure was difficult to obtain and the anesthetist feared to push the ether for muscular relaxation because the pupils quickly dilated.

As the final separation was accomplished the colon opened at the point of ligation and a few drops of intestinal contents were spilled. This was quickly wiped up and a sponge saturated with an alcoholic solution of mercurochrome wiped over the spot. The raw area behind the cecum was covered with peritoneum and a tube placed down to the area that had been soiled.

The abdominal wall was closed in layers with chromic gut and silkworm gut. Time of operation one hour. There was no shock and only moderate acceleration of the pulse.

Pathological report: The specimen was opened and found to be smooth. Only one small polyp was found in the cecum and there were none in the ileum.

After a few days of discomfort the patient again reacted well and except for an infection along the drainage tube and in the fat layer of

the wound her convalescence was as rapid as after her previous operations. The infection rapidly subsided and the patient left the hospital on April 17, 1928. The total number of hospital days was ninety-seven. Her condition on discharge was excellent. Her color was normal, she was strong and healthy and was walking around and her bowels were moving normally each day without cathartics. There was no blood in her stools.

SUMMARY

Following overwork a young woman has an acute infection of the colon with dysentery lasting six weeks. This inflammation never completely subsides, as shown by many attacks of chills, fever, rapid pulse, leucocytosis and high polynuclear count, in the years that follow the original infection.

As a direct result of this, multiple polypi develop in the colon and, in two places, these degenerate into adenocarcinomas.

A total colectomy in multiple stages brings relief.

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Conclusion

All in all I feel, after treating some thousands of patients with inoperable carcinoma, chiefly with roentgen rays, that the results, even temporary and inconstant as they may be, are well worth the time and labor, and I look upon the method as one of the most useful adjuvants to surgery which we have. Whether radiation will ever replace surgery in the treatment of cancer seems from our present knowledge extremely doubtful, but the progress of the last ten years warrants the hope that with the improvement in technique and better classification of patients into suitable and unsuitable groups, more and more will be gained in a palliative sense and possibly a moderate number of cures may ultimately be obtained.

No surgeon can afford to neglect the benefit which may accrue to his patients from postoperative radiation, whether he believes that his operation has been successful or not. There are many operators who do not wish to confess that their surgery cannot do everything, but the number is rapidly growing smaller and public opinion is bringing resistant members of the surgical profession into line. I look forward to the day when every case of a malignant growth will be studied by the surgeon and the radiologist together and the advantages of both methods be simultaneously offered to the patient. (*From Radiation in Malignancy" Francis C. Wood, Practical Lectures*, 1924–26. *N. Y., P. B. Hoeber, Inc.*, 1927.)

END RESULTS OF GONORRHEAL ARTHRITIS

A REVIEW OF SEVENTY CASES

MORRIS B. COOPERMAN, M.D.

PHILADELPHIA

A LARGE proportion of cases of gonorrheal arthritis are of a destructive nature, terminating in partial impairment of function, deformity or ankylosis. These cases are usually monarticular lesions, the onset of which is sudden, the course protracted and at times the symptoms are so severe that they are difficult to allay. Pathologically, the acute reactions may take one of three courses, an exudative periarthritis, infectious synovitis, or panarthritis.

The first type, commonly noted in the smaller joints, such as the wrist and ankle, are characterized by marked pain and swelling, involving tendons, ligaments, muscles, etc. Intra-articular extension occurs in the later stage of the disease, due chiefly to anatomic structure. The articular spaces being small and compact, the infection naturally extends to the periarticular tissues.

Synovial infections are observed in the knee, shoulder or hip. Such cases are characterized by intra-articular exudations of a serous serofibrinous or purulent character. Mild infections of the serous type terminate in normal function, while the serofibrinous types are more serious lesions leading to terminal fibrotic changes.

The more virulent types are distinctly pyogenic in nature, the terminal phases of which may indicate an extensive panarthritis. The end results may lead to complete disorganization of the joint, pathological dislocation or ankylosis. Occasionally the infection is associated with visceral lesions. I have seen several cases of this type terminating fatally.

Aside from the above, there are a large group of cases in which articular symptoms are absent. The clinical manifestations are of a toxic nature characterized by fleeting pains in the muscles and tendons. This is the so called arthralgic type, the symptoms of which are due to toxic absorption from the genitourinary tract.

The protean nature of gonorrheal arthritis is largely dependent upon the strain of the infecting organisms and the susceptibility of the individual. Taking the average case, for example, the symptoms are as follows: There is usually an initial chill, rapidly developing swellings in several joints successively, severe pain, marked sensitiveness to passive motion and the like. Patients are markedly prostrated but the temperature is usually only moderately elevated. In the course of a week or ten days, local symptoms clear up but one articulation still remains bearing the brunt of the infection. Here it merges gradually into a chronic lesion which, after a prolonged interval of time, subsides, leaving residual structural changes with considerable pain and disability.

Periarticular fibrosis with matting together of tendons and fascias, resulting in flexion contractures, are the extra-articular morbid changes, while pannus formation, erosions, shredding and fibrillation of cartilages are frequently noted in the advanced cases of intra-articular pathology. Low grade osteomyelitis and osteoperiostitis have also been occasionally noted.

Osseous ankylosis is a terminal stage of the severe types of inflammation. I have seen two cases of this variety involving the knee joint where actual canalization occurred. It was impossible to ascertain

by roentgenograms where the former joint line was located.

An appreciation of the above facts should make us respect a little more keenly the virulent nature of gonorrheal arthritis and to consider the potentialities for destruction even in the mildest cases that come for treatment. Many physicians still consider gonorrheal arthritis in the light of a rheumatic attack. Gonorrheal rheumatism is an unfortunate term and should be entirely discarded from the nomenclature. It gives the patient an erroneous impression that complete recovery might occur and the physician a false sense of security.

Gonorrheal arthritis, especially of the monarticular type, is not rheumatism. The symptoms are more or less protracted; salicylates rarely, if at all, influence its course, and the terminal results are invariably associated with permanently stiffened and disabled joints, left as souvenirs of some sexual indiscretion. The importance of this subject cannot be too strongly emphasized. These complications are quite common. As a matter of fact more joints have been wrecked by gonorrhea than by all of the other pyogenic infections combined. This disease is unquestionably more common nowadays than tuberculosis of joints, lesions which have been the cause of a great deal of crippling in the past. Thanks to a better knowledge of tuberculosis generally, tuberculosis arthritis is certainly on the decline. Such can not be said, however, of gonorrheal arthritis, which cripples or maims the unfortunate individual.

END RESULTS IN 70 CASES

This group comprises forty-four cases of gonococcus arthritis in young children and twenty-six in adults.

The first represents the cases from a maternity hospital epidemic, a report of which was recently published in *The American Journal of the Diseases of Children*. These infants were about five to six weeks of age when they first came under observation and joint complications were then of three to four weeks duration. One hundred and thirty-six joints were infected and practically every one was of the suppurative variety; hence, they were acute surgical lesions. The portal of entry of the infection was probably the rectum, and joint metastases appeared from the eighth to the tenth day after birth. Fixed infections in one joint were observed in ten cases while in thirty-four these were multiple. The most singular feature, outstanding in significance, was the fact that no death occurred in this group. Another striking feature was the fact that complete recovery of joint function was obtained in 75 per cent of the cases. These results, I believe, can be largely attributed to the natural resistance of the infantile cartilagenous joint structure, and perhaps to the treatment. It is highly probable that the same type of infection in adults would have resulted more disastrously.

These children were treated by vaccines early in the course of the disease, but later these were discontinued as no benefits were noted from their use. The infected mucous membranes were treated by mercurochrome applications and irrigations. The joints were treated by casts, repeated joint punctures, arthrotomies, diathermy, massage and the like.

As a result six infants with relatively mild infections were discharged, cured at the end of three months with normal articular function. Fifteen infants were discharged at the age of five months, cured of joint complications with normal articular function. Twelve infants, more refractory to treatment because of residual palsies and periarticular fibroses, were kept under observation until they were eighteen months of age. Eleven children, who are now about three years of age, are still under treatment. These are hip cases spontaneously dislocating at the onset of the infection and remaining so in spite of all efforts, surgical or mechanical, to accomplish reduction. Profound structural damage which mitigates against any possibility of a cure has occurred in these joints. The

changes revealed by roentgenograms and at operation showed arrested development and distortion of the acetabular cavity, per cent cures. However, this must be considered a favorable result when compared with the reports from others having

Fig. 1.

Fig. 2.

Fig. 1. Case 12. Gonorrheal arthritis of left wrist, seven weeks after onset. Note the partial destruction of intracarpal and carpometacarpal articulations. The radiocarpal joint is normal. Permanent loss of function, 50°.

Fig. 2. Case 16. Ankylosed right wrist one year after onset of gonorrheal infection. Note complete destruction of the carpal articulations and partial obliteration of the radiocarpal joint space.

flattening, fragmentation and even complete absorption of the femoral epiphysis. New articular facets have formed above the normal acetabular cavity. Shortening varies between one-half to three-fourths inch. These children have been walking but with pronounced limps. The shortening is compensated for by shoes with appropriate lifts.

In this group also might be mentioned two infants who have structural changes, one in a shoulder which limits function to a considerable extent and the other in a knee joint which is subluxated.

It is seen that in spite of the most ideal conditions for controlling the terminal results, it was possible to obtain only 75 any experience with these complications in children. Holt, for instance, collected twenty-six cases from The Babies Hospital, New York, of whom fourteen died. Kimball reported 10 cases, six of whom died. Sporadic case reports, appearing from time to time in the literature, show the high mortality of gonorrheal arthritis in young children. I could not obtain any records of functional end results of those that survived the disease.

GONOCOCCUS ARTHRITIS IN ADULTS

A series of twenty-six adult patients, thirteen males and thirteen females, between the ages of nineteen and forty-four, with gonorrheal arthritis in all stages,

were studied over a period of six to eighteen months to determine end results. These were carefully checked up by arthro-

weeks. Seven patients were seen during the subacute stage, the complications having existed two to four months. Five patients

Fig. 3.

Fig. 4.

Fig. 3. Case 1. Gonorrheal arthritis of right knee joint three months after onset. Note osteophytes and spur formation, articular space practically normal. Articular surfaces clearly defined. Lost function, 25°. Treated by aspirations, cast and diathermy.

Fig. 4. Case 5. Gonorrheal arthritis of right knee joint sixteen months after onset. Note rough hazy appearance of the articular surfaces and marked narrowing of intra-articular space. Fibrous ankylosis. Treated non-surgically.

metric readings, mensuration and roentgenograms.

Monarticular lesions were found in nineteen cases; the complications were of the multiple variety in seven patients. Fifteen of these patients were seen during the acute stage of the disease; five, four weeks after onset; five, three weeks; two, two weeks; two, one week, and one six with residual deformities of seven to eighteen months duration were admitted to the hospital for correction of flexion deformities.

Two male patients died during the acute stage of the disease. One, aged twenty-seven, four weeks after onset of a knee complication developed a septic meningitis, probably of gonorrheal origin. The

other, a colored man, aged thirty-four, died two weeks after admission to the hospital and six weeks after onset of the

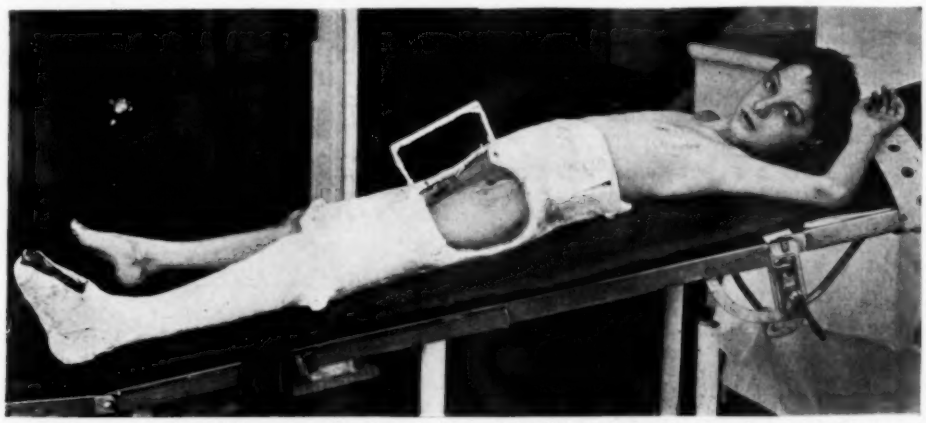

Fig. 5. Fenestrated cast employed in gonorrheal arthritis of the hip joint when arthrotomy is deemed necessary. Both hips are included to assure adequate immobilization.

disease. Examination of this patient revealed a septic temperature, polyarthritis, and a prostate loaded with pus and gonococci. At autopsy a gigantic vegetation on the aortic leaflet was found obstructing the aortic valve, also metastatic abscesses in the lungs, liver and kidneys.

DIAGNOSIS

Seventeen cases were authentic gonococcus infections. This was based upon the history of a recent venereal infection, the discovery of gonococci in the discharges and joint exudates and by blood tests.

Five ancient infections, consisting of three pathologically flexed knee joints, one palmar deformity of the wrist and one case of bilateral heel spurs, were diagnosed by the history, which indicated a genitourinary infection preceding onset of joint complications. The fixation test proved negative and no gonococcus infection could be demonstrated in the genitourinary tract at the time they came under observation.

In the absence of bacteriologic or serologic evidence, the diagnosis of the infectious arthridides must be based on history. While the roentgenogram is of invaluable aid in ascertaining the extent of structural damage, there is nothing of a distinctive character on the films to justify the diagnosis of a gonorrheal infection, because other organisms of the pyogenic group give similar roentgen-ray findings. Too much reliance can not be placed on the complement fixation test which is more often negative than positive.

Four acute cases, regarded as gonococcus infections, were not clear cut. Repeated serologic and bacteriologic studies of the secretions were negative. Here again the history of an antecedent venereal infection, the absence of demonstrable active foci of infection elsewhere and the protracted course substantiated the opinion that these were gonococcus complications.

One male patient with an acute ankle gave a history of an ancient venereal infection but no recent contact. A study of the genitourinary tract revealed a soft spongy prostate loaded with pus but no gonococci were discovered on repeated smear studies. The gonococcic fixation test was negative on two examinations. No other foci of infection were found. This case was probably a non-venereal prostatitis with joint symptoms. A prompt recovery ensued on active treatment of the genitourinary tract focus and the administration of salicylates.

GONORRHEAL ARTHRITIS IN PREGNANCY

Six women, during the course of pregnancy, developed acute gonorrheal arthritis.

Case xvii. A woman, aged twenty-four, developed an acute arthritis of the left elbow, following a criminal abortion. The husband admitted gonorrhea and having had sexual intercourse with her. The patient gave a history of having had a purulent vaginal discharge with frequency and burning on urination several weeks prior to the abortion. This patient was subsequently operated upon for pyosalpinx and both tubes were removed. The elbow was incised and drained. No organisms were found in the joint exudates. The vaginal and cervical smears were negative for gonococci. No cultures were made from the pus tubes. The gonococcic fixation test was negative. The diagnosis of gonorrheal arthritis was apparently based upon the history since no other foci of infection were found.

Case xix. A female, aged twenty-nine, in the ninth month of pregnancy became acutely ill with what was considered acute rheumatic fever. She presented congested tonsils, the temperature ranged between 103°F. and 104°F. Five or six joints were involved. On repeated examinations the vaginal smear was negative for gonococci. She was delivered in a normal manner during the height of the illness, about one week after admission. The course was rather stormy, the temperature ranging between 101°F. and 102°F. for one month. The infection became finally fixed in the right hip, left knee and left ankle. Fifty-two days after onset she was transferred from the maternity ward to the Mt. Sinai Hospital where she remained for three months. A destructive process in the right hip and left ankle were revealed by roentgenograms.

The gynecological examination made by Dr. Charles Mazer showed endocervicitis and erosion of the cervix which he considered gonorrheal even in the absence of bacterial proof. The tonsils were small and diseased. The gonococci fixation test was negative. There was considerable speculation regarding the nature of the arthritis. In carefully questioning her husband he admitted having had acute gonorrhea and having had intercourse with her. During the early part of the ninth month a purulent vaginal discharge with frequency and burning on urination was noted, but she attributed these symptoms to her pregnancy. All studies failed to disclose the bacteriologic nature of the infection. This patient was under treatment for about two years; discharged with three-fourths inch shortening and partial destruction of the femoral neck and acetabulum.

It is highly probable that gonorrhea was the underlying cause in this case. The prolonged course and the marked destruction of the involved joints was more in keeping with a gonorrheal infection than a tonsilar one.

The other cases resembled the above in history, clinical course and terminal results. Joint complications appeared in the second, third, sixth and eighth month of pregnancy. With the exception of one woman, who aborted spontaneously, all went to term and were delivered normally. A singular feature in this connection is the fact that the newborn did not develop any complications.

The diagnosis of gonorrhea in pregnancy is of very vital importance, especially as it pertains to maternities, because of the danger of carrying infection from one patient to the other. No pregnant patient with a joint lesion should be admitted to the general maternity wards with a history suggesting gonorrhea. Repeated bacteriologic studies of vaginal secretions should be made to exclude the possibility of gonorrhea.

TREATMENT

An analysis of the end results reveals a few outstanding facts which are of practical therapeutic significance. Eight patients, presenting monarticular lesions referred during the acute stage, were treated by aspiration, arthrotomies and casts. Following these procedures, pain and suffering were promptly relieved. In the course of two to four weeks there was a marked improvement of the inflammatory symptoms with no malpositions. An increased range of motion was rapidly obtained when the acute conditions had sufficiently subsided to start supplementary diathermal treatment, baking and massage. Residual periarticular infiltration and fibrosis were practically negligible when examined from four months to a year later. The residual loss of mobility

ranged between 20° to 45° and roentgenograms showed slight structural changes.

When we compare these cases with the others referred during the subacute or chronic stages, we are impressed with the striking difference in end results. Four patients presented pathological flexion deformities of the knee joints with marked restriction of motion due to adhesions and absorption of cartilages. They had been treated conservatively along conventional lines for periods varying from seven to eighteen months. Thirteen patients were treated along conventional non-surgical lines and referred to the surgeon two to three months after onset. Marked structural changes in the joints were noted in eight cases. Four hip joints showed terminal ankylosis in three instances and one a subluxation. Two wrist joints showed marked restriction in motion due to intra-articular adhesions. Two knee cases showed by roentgenograms narrow joint spaces and marked thickening of the synovial membrane.

These results indicate the importance of an early diagnosis of the acute surgical gonococcus joint and the necessity for surgical intervention when one visualizes the pathological processes. Inflammatory exudates must be evacuated at the earliest possible moment to save the joint from destruction. Aside from this it is the only means at our command that will relieve pain and suffering so instantaneously. Regardless of any other treatment one may favor, aspiration and occasionally arthrotomy in the severe cases are remedies par excellence. With attention to rigid cleanliness, aspiration is a perfectly sane and harmless procedure that can be performed at the bedside of the patient by any practitioner.

A word might be said regarding hip complications in gonorrhea. These were the most serious from the standpoint of ultimate functional results, regardless of the treatment employed. The ravages of these complications might be greatly mitigated by aspiration or arthrotomy, if diagnosed early enough, followed by skeletal traction in an abduction frame. But because of the deep situation of this joint, surrounded by powerful bulky muscles, which obscure intra-articular pathology, an early diagnosis is rarely made by roentgenogram or physical examination. When it is finally recognized it is too late to expect favorable results because destruction of the cartilages has already intervened.

Under such circumstances the intense pain and suffering might be allayed, the further progress of the destructive process arrested and the tendency toward flexion adduction deformities and pathological dislocations prevented by prolonged fixation in abduction casts. The lower limbs are placed in moderate abduction, 10° of flexion at the hip, the feet pointing straight upward. The cast is applied over a well-padded pelvis, reaching from the lower thoracic borders to the toes on the affected side and to the knee on the other side. When placed on Bradford frames these patients are infinitely better off and the nursing problem is greatly alleviated.

The ankylosing process should never be interrupted by manipulations, except to correct malpositions if the roentgenogram shows destroyed cartilages and absorption of bone. Hugh Owen Thomas's dictum of enforced uninterrupted and prolonged rest is distinctly applicable to these destructive hip complications. Weight and pulley extension is a delusion and a snare, as is diathermy or any other form of physiotherapy. When the acute inflammatory symptoms have subsided, the patient should wear a circular seat caliper brace with pelvic band for a considerable period of time, to be discarded when the condition has become quiescent. If he wishes restoration of mobility, arthroplasty on the hip might be attempted a year or two later.

Severe periarticular infections of the wrist usually terminate in permanent loss of function when treated conservatively.

TABLE SHOWING END RESULTS OF GONOCOCCUS ARTHRITIS IN ADULTS

Name	Sex	Joint Involvement		Treatment	Results
		Stage	Duration		
1. S. T.	F.	Acute Rt. knee	4 wks.	Aspiration, cast and diathermy	Excellent functional result at the end of 4 mos. Range of motion 70/170 lost function 25°. Roentgen ray, moderate lipping and osteophytes.
2. L. G.	F.	Acute L. knee	3 wks.	Aspiration, cast and diathermy	Good functional result at the end of 6 mos. Motion 75/170 lost function 30°. Roentgen ray, joint space narrower than normal. Pain and stiffness in damp weather.
3. B. S.	M.	Acute L. wrist	4 wks.	Diathermy, moulded plaster splint	Poor functional result at the end of 3 mos. Motion 45/140 lost function 50°. Roentgen-ray, carpal joint cartilages hazy. Marked osteoporosis.
4. M. C.	M.	Acute L. elbow	3 wks.	Aspiration, cast and diathermy	Fair functional result at the end of 4 mos. Motion 80/160 lost function 40°. Roentgen ray, absorption of ulnar cartilage and narrow joint space.
5. S. B.	F.	Fibrous ankylosis Rt. knee with 40° flexion deformity.	9 mos.	Deformity corrected, adhesions broken down, cast and Thomas knee brace.	Fibrous ankylosis 10° of flexion at the end of 6 mos.
6. D. B.	M.	Stiff, painful knees and flat feet. Chronic prostatitis.	6 mos.	Baking, massage and arch braces. Prostatic massage.	Marked relief of symptoms at end of 6 wks. Roentgen ray negative.
7. S. P.	M.	Acute Rt. hip	8 wks.	Cast and hip brace	Destruction of Rt. hip joint with subluxation 1¾" shortening at the end of 1 yr. Wandering acetabulum. Wears extension shoe.
8. S. R.	M.	Subacute L. knee	7 wks.	Cast and Thomas knee brace	Ankylosis at the end of 6 mos. Roentgen ray, complete destruction of knee joint, articular space narrow and cartilage absorbed. Joint quiescent no pain.
9. M. G. Pregnant during the acute stage.	F.	Acute Rt. knee	3 wks.	Aspiration, cast, diathermy, baking and massage.	Excellent functional result at the end of 4 mos. Range of motion 75/170 lost function 30°. Roentgen ray, slight narrowing of joint space. Infrapatellar fat pads are sensitive and hypertrophied.
10. R. C.	M.	Subacute L. hip flexion adduction deformity.	3 mos.	Manipulation, cast and brace	Practically an ankylosis 10° flexion and 20° rotation at the end of 5 mos. Roentgen ray, shows obliteration of joint space, absorption of articular cartilages. Has pain on change of weather and on overuse. Wears a brace.
11. M. S. Pregnant during the acute stage.	F.	Chronic L. knee flexion deformity.	9 mos.	Manipulation, cast and Thomas knee brace.	Flexion deformity corrected. Knee ankylosed. Wore brace for 3 mos. Joint quiescent.
12. M. G.	M.	Acute L. wrist	4 wks.	Plaster Paris splint, diathermy, baking and massage.	Fair result at the end of 4 mos. Lost function 50°. Roentgen ray, fusion of carpals, marked osteoporosis.

TABLE SHOWING END RESULTS OF GONOCOCCUS ARTHRITIS IN ADULTS.—*Continued*

Name	Sex	Joint Involvement		Treatment	Results
		Stage	Duration		
13. M. M. Pregnant during the acute stage.	F.	Acute L. knee	1 wk.	Cast, repeated aspiration, joint lavage and diathermy.	Normal articular function at end of 2 mos. Slight infiltration of the infrapatellar fat pads. Roentgen ray, negative. Patient aborted spontaneously during 3rd month of pregnancy, 3 weeks after onset of joint complication.
14. B. M.	F.	Acute L. hip and L. knee	2 mos.	Manipulation and cast	Patient still under treatment 4 mos. after onset. Ankylosis of L. hip flexion adduction deformity corrected. Roentgen ray, destruction of cartilages.
15. J. M.	M.	Acute L. shoulder	3 wks.	Diathermy and splint	Complete restoration of function at the end of 3 mos. Roentgen ray, negative.
16. S. G.	F.	Chronic Rt. wrist ankylosis with palmar deformity.	1 yr.	Manipulation and celluloid splint.	Ankylosis of wrist joint 15° dorsal flexion. Roentgen ray shows complete destruction of carpal articulation. Function of hand greatly improved.
17. J. P. Pregnant at onset of joint complication, criminal abortion	F.	Acute L. elbow	4 wks.	Incision and drainage, cast and diathermy. Salpingectomy pus tubes.	Range of motion 80/160 lost function 55° at the end of 3 mos. Roentgen ray, narrowing of joint space, destruction of ulnar articular cartilage.
18. G. K.	M.	Acute Rt. sacroiliac.	1 wk.	Buck's extension, jacket. Injections of Oxoate, g.u. treatment and Pregl's iodine into prostate.	Slight stiffness in bending, tenderness over the lower back, at the end of 3 mos. Roentgen ray, negative.
19. N. T. In 9th month of pregnancy during the acute stage.	F.	Subacute Rt. hip, L. knee and L. ankle.	2 mos.	Casts, brace, diathermy, baking and massage.	Complete destruction of Rt. hip. Restricted mobility of L. ankle and knee. Roentgen ray, narrowing of joint space. Rt. lower extremity ¾″ shorter than left.
20. M. R. Acute G. C. arthritis acquired in 6th month of pregnancy.	F.	Acute L. knee	2 wks.	Aspiration, cast. Baking and massage.	Excellent functional results at the end of 3 mos. Motion 65/170 lost function 15°. Roentgen ray negative.
21. M. A. G.	F.	Chronic Rt. knee with 40° flexion deformity.	15 mos.	Forcible manipulation, cast and Thomas brace.	Flexion 80°, extension 165° lost function 35° at the end of 1 yr. Roentgen ray, narrowing of joint space. Articular cartilages normal. Tender hypertrophied fat pads. Stiffness and pain in damp weather.
22. J. J.	M.	Painful heels, postgonorrheal.	14 mos.	Exostoses on inferior surface of oscalcis removed.	Cured.
23. H. L.	M.	Acute L. ankle.	10 days	Aspiration, cast and baking.	Excellent functional results at the end of 7 wks. Roentgen ray, negative. Slight periarticular swelling persists.
24. L. H.	M.	Chronic bilateral knee and L. shoulder.	6 mos.	Diathermy, baking and massage.	Restricted mobility of L. shoulder, normal mobility of knee joints. Roentgen ray of knee joints, negative. L. shoulder, osteophytes. Patient improved after 2 mos. treatment.
25. J. S.	M.	Acute Rt. knee and L. hip.	5 wks.	Aspiration, cast and extension.	Died 2 wks. after admission to hospital. Meningitis.
26. H. H.	M.	Polyarthritis.	6 wks.	Medical.	Died 1 wk. after admission to hospital. Vegetative endocarditis gonococcus septicemia.

Kinsella describes an area of redness and tenderness on the dorsal surface of the wrist as the site for incision, which is made down to the capsule but not into the joint. The after treatment consists in the local application of warm hypertonic solution. Normal articular function was obtained in a number of cases so treated. A number of infants with acute wrist infections were treated in the above manner with similar results.

Casts. Collings employed heavy plaster casts in the acute gonococcus joints with good results. Fixation of acutely infected joints in casts to secure absolute physiologic rest is a perfectly rational procedure exceedingly valuable in gonorrheal arthritis. The sensitive joints are protected when the patient is moved about, muscular contractures are allayed and frictional irritation of contacting inflamed articular surfaces abolished. A combination of aspiration with immobilization in fenestrated casts, in my experience, gave highly satisfactory results.

Diathermy. Diathermal treatments were instituted in many cases during the subacute stage of the disease. An increased range of motion was secured but painful symptoms returned with increased intensity in those cases showing advanced pathology. The disability and pain associated with these incompletely healed cases does not warrant attempts to restore mobility. It is far better to secure quiescent than mobile articulations, sensitive and painful on functional use. Diathermy and other forms of physiotherapy are employed to advantage in cases where there is slight intra-articular damage and in periarthritic forms.

Other physiotherapeutic measures of considerable benefit in enhancing circulation and thus improving the morbid pathology are Bier's hyperemia, baking, massage and hydrotherapy. The residual functional impairment, due to periarticular fibrosis, is greatly ameliorated by a prolonged course of physiotherapy.

CORRECTION OF RESIDUAL DEFORMITIES AND ANKYLOSES

Joints ankylosed in good positions should not be disturbed. Ankylosed articulations are better tolerated than those that are mobile and painful. Residual contractures or malpositions, if they produce pain and disability, are best treated by gentle manipulations under anesthesia, the deformities being corrected and the limb immobilized in plaster of Paris casts in an elected position for future function. A suitable brace is then worn for an extended period of time until the reparative process is completed. Attempts at restoring mobility to joints showing advanced intra-articular pathology are futile, fraught with the dangers of aggravating or lightening up a latent infection, and hence are definitely contraindicated. Such cases are best treated by arthroplasties performed a year or two later the results of which, as reported by Murphy, Baer, Campbell and Putti, have indeed been remarkable.

COMMENT

It is not the province of this communication to consider the genitourinary or systemic phases of the infection as observed in the adult patients referred to in the foregoing. Suffice it to state that all of the patients, before they were referred for orthopedic or surgical treatment, had received vaccines, sera, salicylates, iodides, etc. The genitourinary tract had been adequately treated by my associates. It became apparent sooner or later that very little impression was being made upon the articular complications by this treatment. It appeared that the monarticular infections were most intractable, resisting all efforts in allaying the local symptoms or preventing the progress of the pathological process. Cases referred during the acute stage and treated surgically responded promptly. The period of disability was considerably shortened, structural joint changes were slight or absent and articular function showed slight impairment.

Contrasted with these are the cases referred in the later stages. These joints showed extensive intra-articular damage, marked impairment function and deformity.

A resume of the terminal results in the seventy cases reported above indicates the necessity for an early diagnosis of the acute surgical gonococcus joint and the institution of surgical treatment at the earliest possible moment. Failure to recognize these lesions or procrastination of an early surgical therapy leads to irreparable damage.

CONCLUSIONS

(1) The nature and severity of the acute monarticular types of gonorrheal arthritis are best determined by qualitative and bacteriologic examinations of joint exudates obtained through joint punctures. These studies are criteria of superlative diagnostic and prognostic value.

(2) Gonococcus joint metastases are of pyogenic origin in a large proportion of cases, with a clinical course simulating the other pyogenic arthridides. Residual periarticular fibrosis, partial or complete destruction of the articular elements and malpositions are common terminal results.

(3) The relief of intra-articular tension through aspirations or arthrotomies, combined with temporary fixation in casts are the remedies par excellence during the acute stage of the disease. These measures are important adjuvants to systemic and genitourinary therapy.

(4) Physiotherapy in the forms of diathermy, baking and massage are exceedingly valuable supplementary measures during the subsiding stage of the gonorrheal infection.

(5) Joints showing advanced intra-articular pathology with ankylosis as an inevitable issue are best managed by the prolonged use of mechanical appliances to prevent malpositions and joint strain.

VAGINAL HYSTERECTOMY

TECHNIQUE AND INDICATIONS. REPORT OF 123 CONSECUTIVE CASES

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VAGINAL hysterectomy, an operation formerly much in favor, has tended to fall into disuse in recent years, so that today the greater number of surgeons have abandoned it. It was discredited largely because abdominal hysterectomy with perfected technique showed a smaller percentage of mortality; consequently, the latter rapidly displaced the former in favor.

We are, however, convinced that vaginal hysterectomy still remains an excellent procedure and should frequently be the operation of choice, provided its technique is well established and that the indications point to its use.

Having been trained to consider vaginal hysterectomy with the use of fixed clamps favorably, we came soon to abandon this type of operation because (1) there is severe primary and secondary hemorrhage; (2) the fixed clamps and the macerated tissues which they leave to be eliminated create an ascending route of infection; (3) there is danger that the ureter, intestine, or omentum might be grasped by clamps applied without visual control; (4) there is absence of peritonization with resultant adhesions, and (5) there is a painful postoperative course.

The vaginal route is the natural and logical one and has the added advantage of much less operative shock than occurs in abdominal hysterectomy. Consequently we have attempted to develop a better technique.

OPERATIVE TECHNIQUE

Preoperative Measures. The vagina is disinfected by injections of oxycyanide of mercury, 1:1000, four times daily. A purgative is given three days before operation and an enema the night preceding operation. Complete shaving of the field is done the same evening, followed by aseptic dressing.

Operation. The patient is catheterized in the dorsal recumbent position. The region is painted with tincture of iodine. Two short retractors are put in place, the vaginal walls and cervix are next painted with tincture of iodine; the vaginal orifice of the uterus and the cervical cavity are then disinfected by thermocautery.

Two Museux forceps (tenaculum forceps) seize the anterior and posterior lips of the cervix, so as to pull the uterus downward presenting the cervix for incision.

1. Incisions. Make a short curved transverse incision toward the anterior concavity on the posterior surface of the cervix, keeping close to the cervix so as to be certain to avoid the rectum which frequently bulges into the posterior cul-de-sac. This incision must cut through at once the entire thickness of the mucosa. The posterior incision is made first so as to avoid the blood flow from a primary anterior incision.

Pull down the cervix and make a similar incision on the anterior aspect, again keeping strict watch to avoid the bladder which is frequently prolapsed.

These two incisions meet on the two sides of the cervix which they surround elliptically and are then prolonged for about 2 centimeters into the lateral cul-de-sacs, as Segond recommends, to give sufficient operative space and a greater security as regards the ureters.

2. Opening the Peritoneum. Using curved scissors, detach the mucosa from the cervix in the posterior cul-de-sac. The concavity of the scissors is directed

forward and their point kept in contact with the uterine muscle. As soon as the plane of cleavage is reached, the index finger, covered with gauze, completes the detachment. The peritoneum of Douglas' cul-de-sac is then torn with the finger or opened with the scissors. The closed scissors are introduced directly into Douglas' sac, opened forcibly and pulled out wide open. The cul-de-sac is then widely open and the short posterior retractor is replaced with a long one that

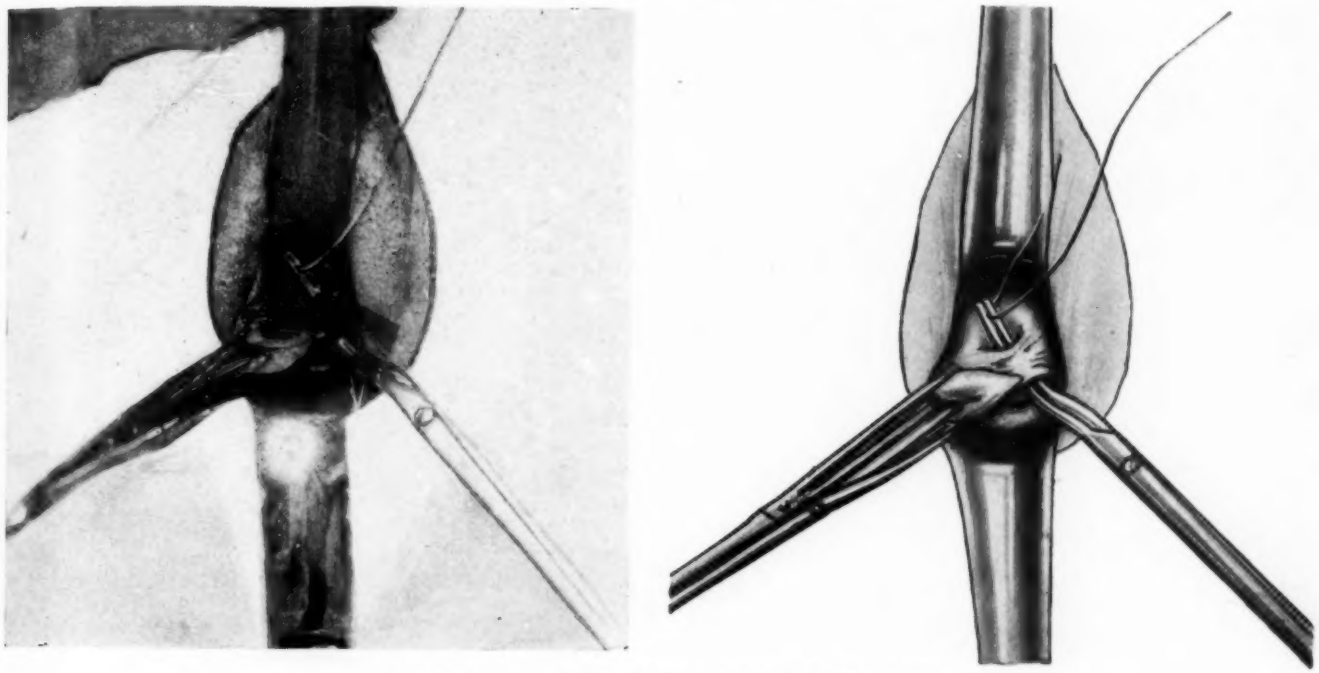

Fig. 1. The curved forceps, used in passing the thread, lifts the uterine artery.

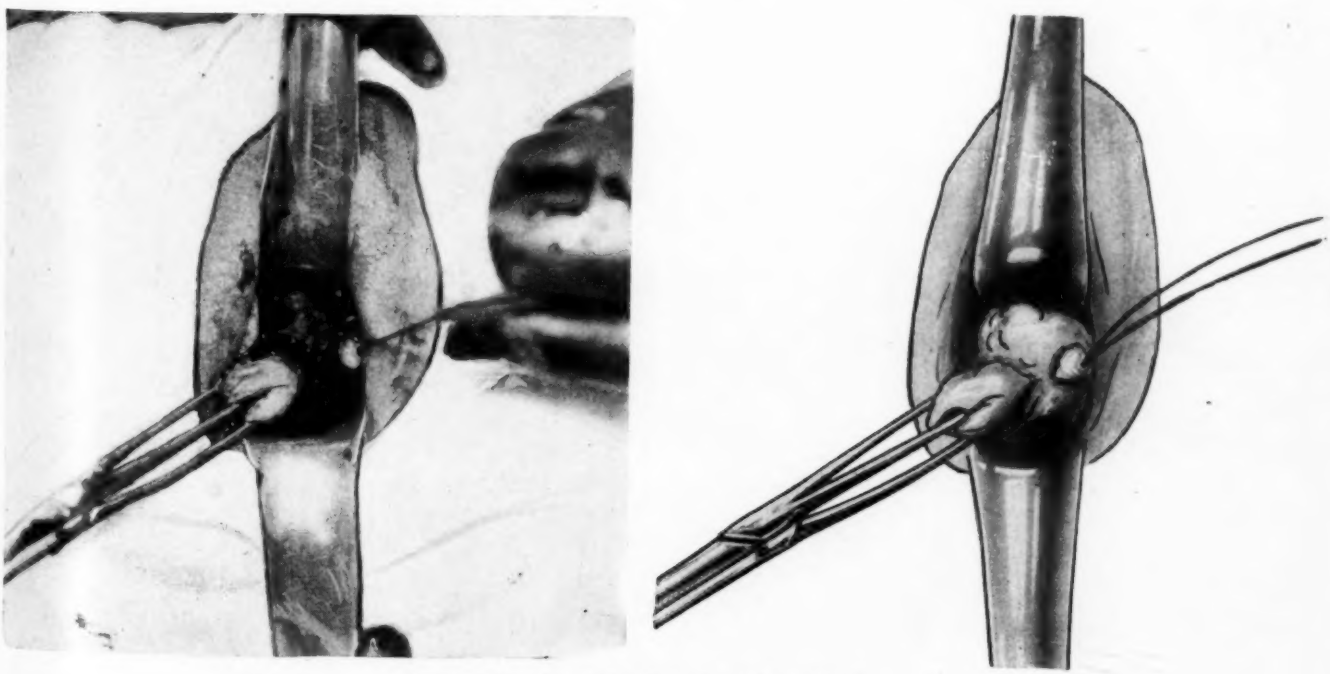

Fig. 2. Section of the ligated uterine artery.

penetrates into the peritoneal cavity. A large compress attached to long forceps or better, to a heavy wire, is introduced into the anterior vesicouterine cul-de-sac, closely following the anterior uterine surface; enlarge the opening with the shut and

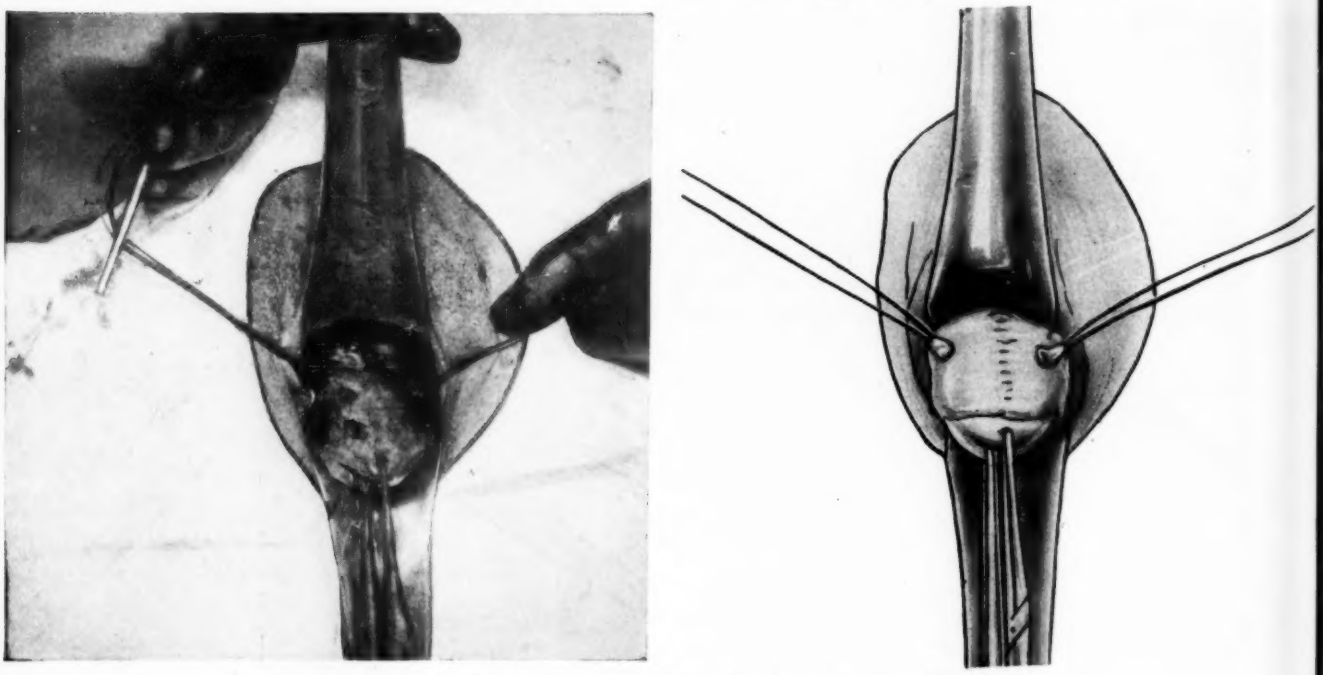

FIG. 3. The two uterine vessels tied and sectioned, and uterus brought down.

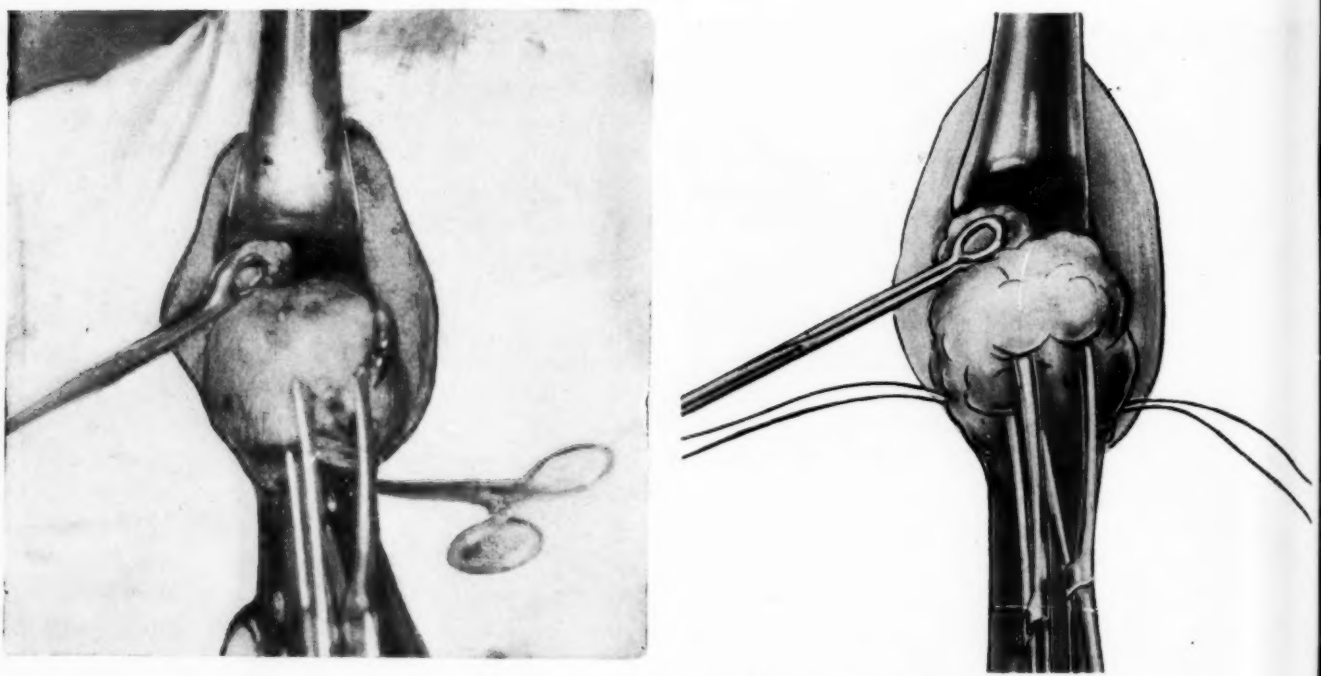

FIG. 4. Anteversion of uterus. Right adnexa exteriorized.

the peritoneum and holds back the mass of viscera.

Proceed in the same manner to open open scissors as above. In order to detach the ureters and the peritoneum laterally, replace the short anterior vaginal retractor

with a long one which will penetrate into the peritoneal cavity and lift the bladder and ureters out of the way.

left broad ligament along the cervix to the uterine artery, which is then surrounded by a ligature which is tied (Fig. 1). The

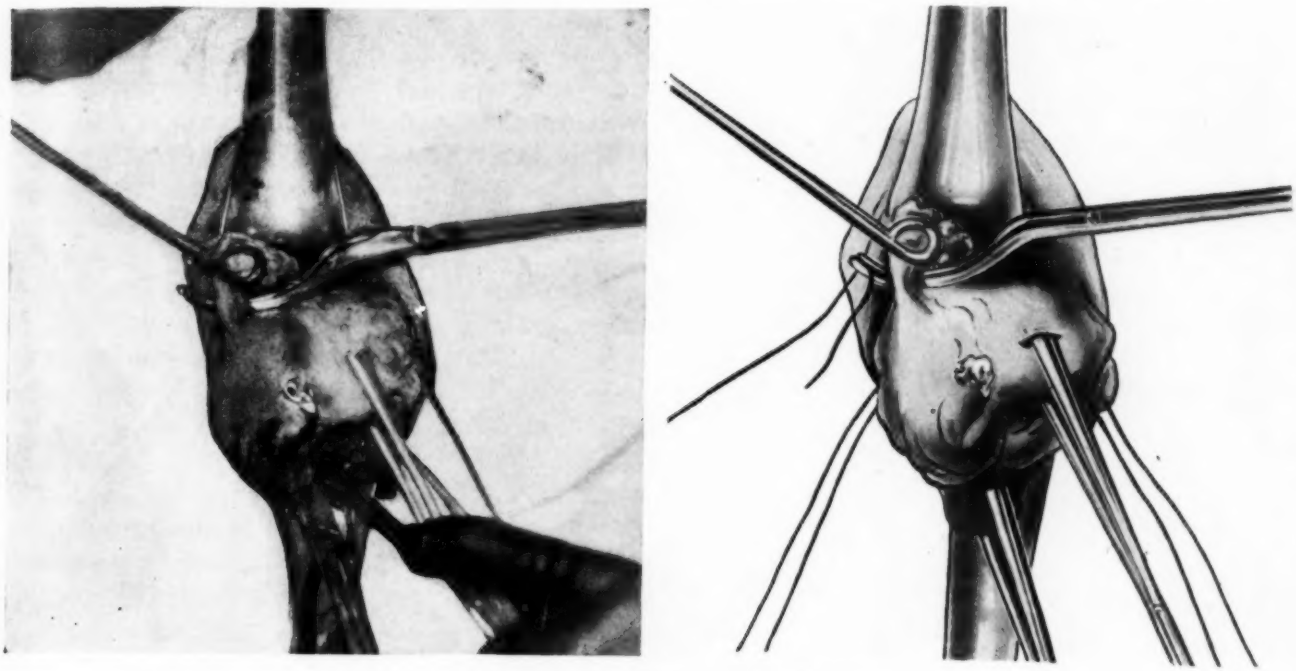

Fig. 5. Ligation of right utero-ovarian ligament.

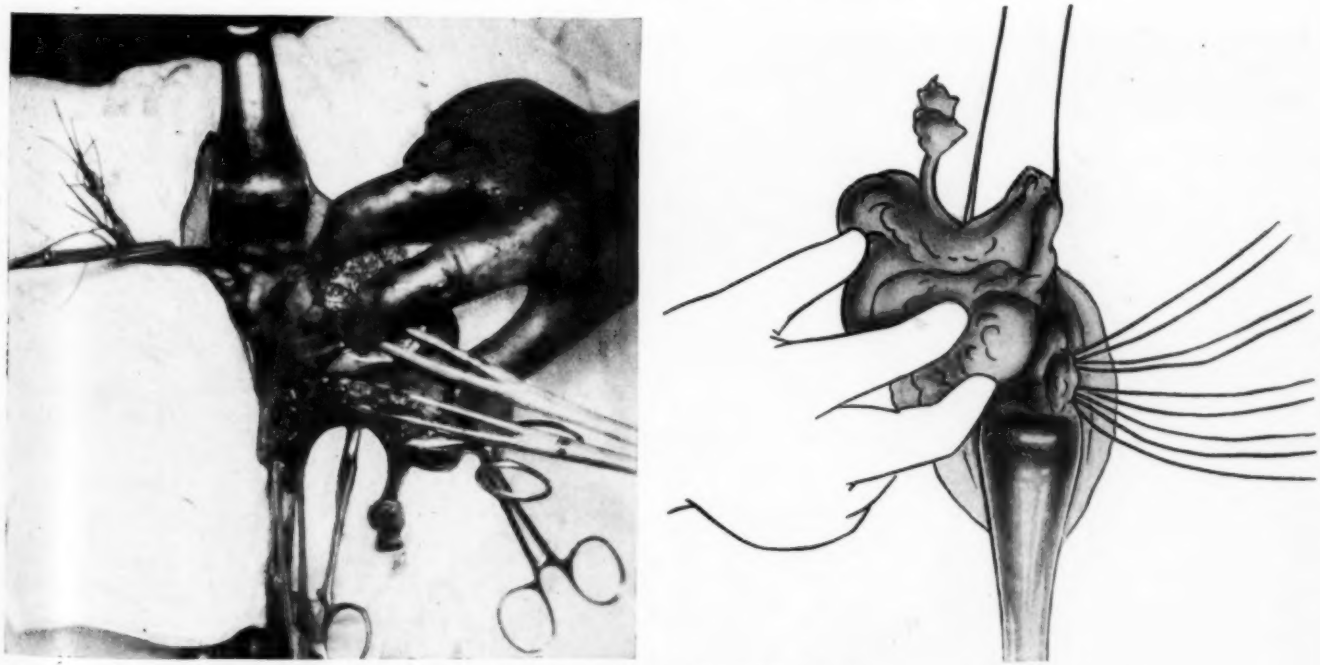

Fig. 6. Section of ligated broad ligament.

3. Ligation of the Uterine Arteries. The cervix is pulled down and to the right and the finger, covered with gauze, detaches the tissues from the base of the

artery is then sectioned between the uterus and the ligature and the uterus drops considerably (Fig. 2).

Drawing the cervix uteri to the left, the

right side is exposed and its artery is similarly ligated. When the two arteries are thus sectioned, the uterus descends

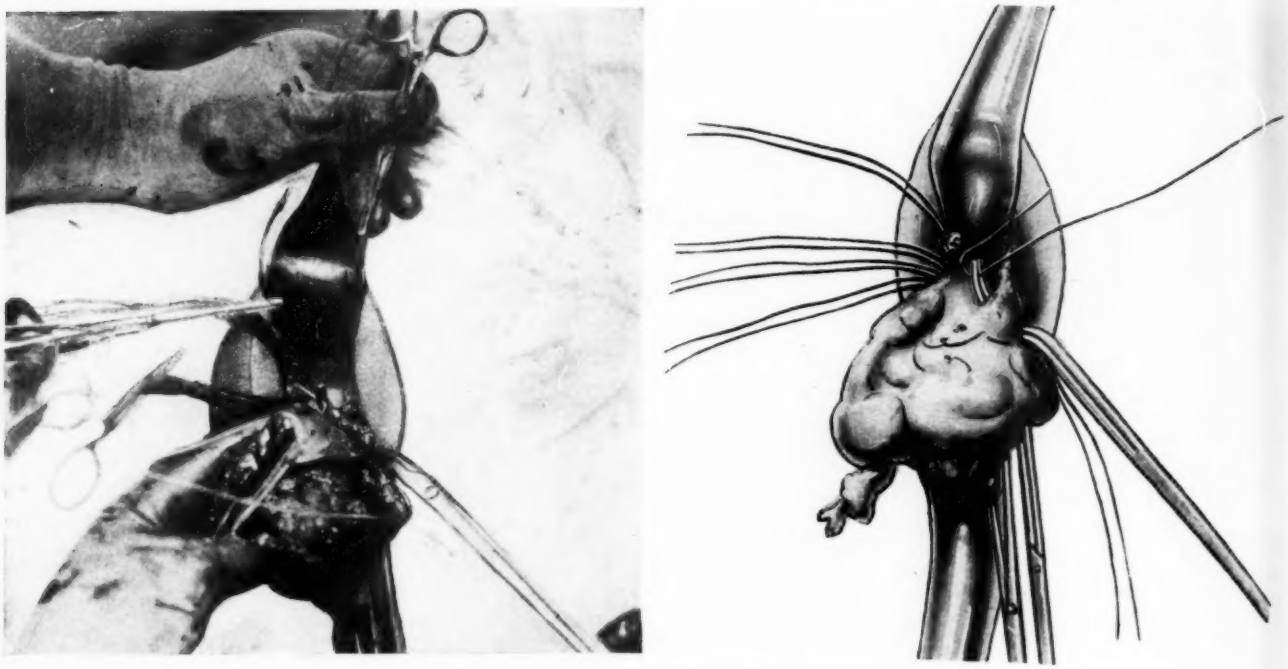

Fig. 7. Ligation of left utero-ovarian ligament.

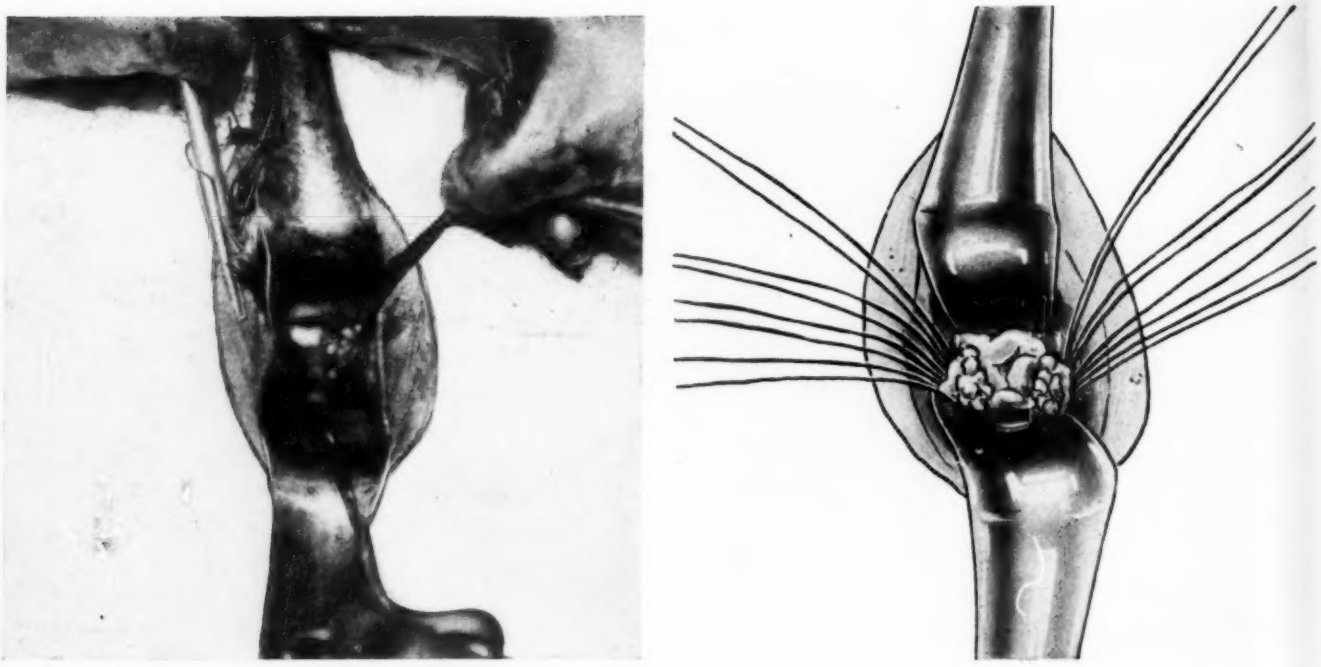

Fig. 8. Raised uterus, showing intestine and two stumps of broad ligament.

considerably and the cervix is largely outside of the vulva (Fig. 3).

4. Version of the Uterus. Lower the uterus forcibly. If it is not very voluminous, the fundus will show against the anterior retractor. This is grasped and drawn down with Museux or tenaculum forceps with resulting anteversion.

The cervix falls back upon the posterior

retractor and comes into contact with the compress isolating and holding back the intestine. If the uterus is very large it is forceps on which sufficient traction is exerted to obtain version of the fundus (Doyen).

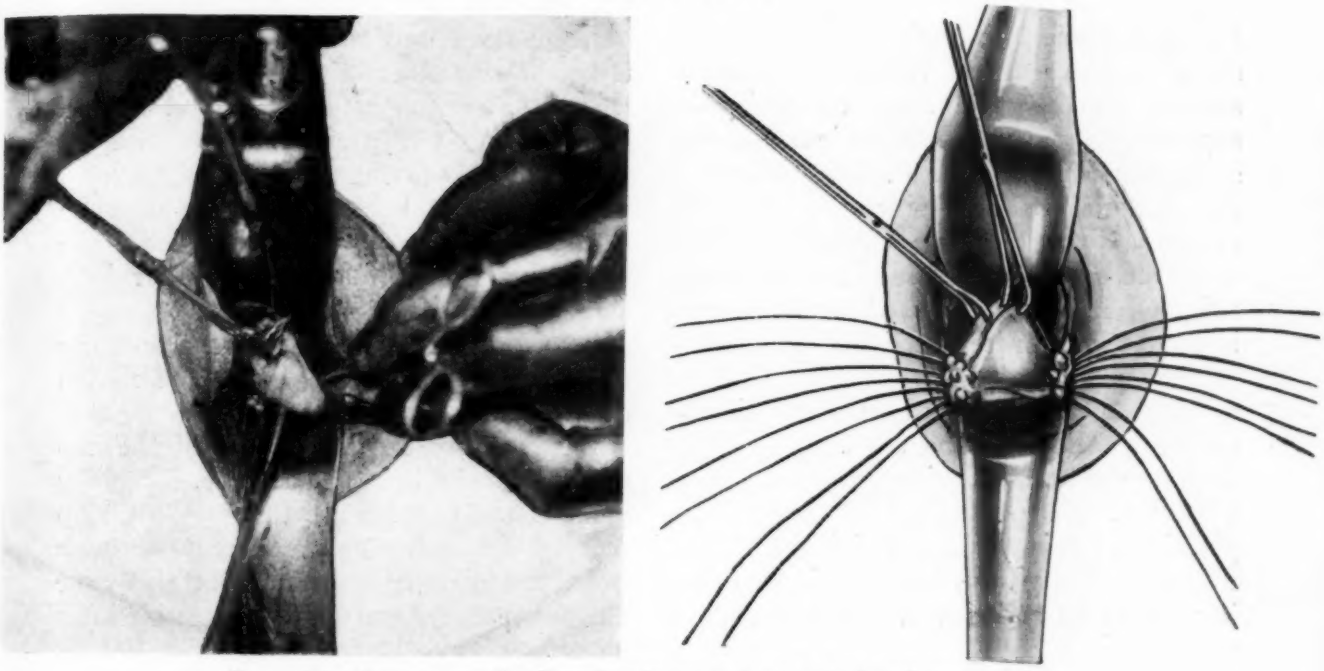

Fig. 9. Two forceps exposing lips of peritoneum (retrovesical and retrorectal).

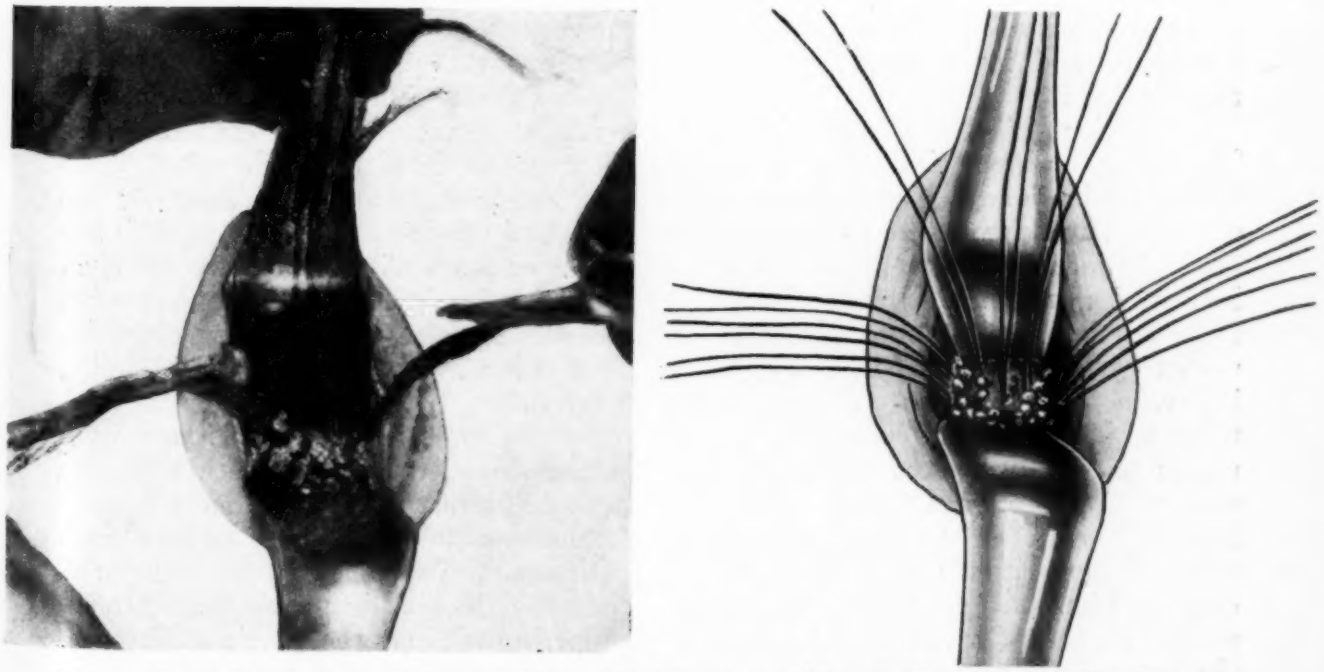

Fig. 10. Sutured peritoneum. Extreme points exteriorize stumps of broad ligaments and assure perfect peritonization.

necessary progressively to divide the anterior wall in the median line and seize the edges of the incision with Museux

Sometimes one happens upon a fibroma which can be extirpated by holding it with "cork screw" or bullet forceps and then

loosening it with a long spatula or curved blunt scissors. The uterus, thus reduced, is then easily brought forward.

5. Ligation of the Utero-ovarian and Round Ligaments. It is now possible to see the upper edge of the broad ligament and the adnexa which are palpated by the exploring finger and from which, if necessary, adhesions are freed. The adnexa of the more accessible side will first be grasped with a special (Doyen) forceps which permits of exposure without damage (Fig. 4). The curved armed needle forceps is used to perforate the broad ligament a little way from the uterus below the tube (Fig. 5). No. 3 catgut is used to tie the pedicle of the tube and the ovary, tightly binding the utero-ovarian ligament. Often, to avoid all possibility of subsequent yielding of this ligature which lies off the utero-ovarian artery, I anchor it by drawing one of its ends into the soft parts and tying again.

Now cut horizontally to detach the tube and the ovary which remain attached to the uterine horn. With the armed needle forceps, lift and tie the round ligament and then section it.

6. Ligation of the Broad Ligament. The finger, covered with gauze, carefully follows the border of the uterus from above downward and commences to separate the broad ligament from the uterus. The uterine arteries are found already tied in its lower portion. Two or three ligatures are placed with the armed needle forceps at intervals on the broad ligament, care being taken to keep more and more close to the uterus as one approaches the cervix. The tissues are sectioned after they are ligated. The first knot of ligature must be wound tightly with the tip of the finger and care must be taken not to pull the ends in making the second knot so as not to unloose the first. In spite of the slight torsion of the broad ligament produced by version of the uterus, the ligatures if well tied will not loosen since they are taken in the ligament through which they pass. It is well to section the broad ligament full ½ cm. from the ligature. The uterus now is attached only by the broad ligament of the opposite side which is much easier to expose (Fig. 6). Proceed as before with ligation of utero-ovarian and round ligaments, then of the uterine artery and broad ligament of this side. Section after each ligation and then remove the uterus and its adnexa. If the adnexa present adhesions which seem impossible to loosen, one may tie the tube at its uterine, insertion, cut it and continue sectioning the broad ligament after ligation, momentarily abandoning the clamped adnexa and extirpating them secondarily after more space has been given by ablation of the uterus.

Next, verify the hemostasis of the two stumps of the broad ligaments. The long ends of the catguts are taken in a clamp on each side and exposure of these surfaces is easy. It is well to replace at this time the compress supporting the intestine after wetting it if necessary with ether or, better, with warm prepared horse serum.[1]

7. Closure of the Peritoneum. Peritonization of the operative field and of the pedicles of the broad ligaments is now done.

After gently removing the anterior and posterior retractors, the operator notes the anterior lip of the peritoneum (anterior cul-de-sac) and the posterior lip (Douglas' cul-de-sac). The two lips of the peritoneum are seized in the forceps (Fig. 9) and after the gauze pad has been removed the serosa is closed by catgut at three points in U-shape (Rouffard, Bouilly, Sanger).

The extreme points of this peritoneal suture should include on both sides the peritoneum of the broad ligament in such fashion as to cover the pedicle with peritoneum. Thus the sutured pedicles of the two broad ligaments will remain subperitoneal and the pelvic cavity will be totally covered with peritoneum as we have established by work on the cadaver.

This immediate closure of the peritoneum by suture makes the postoperative course much less painful and far more

[1] Petit, R. *Rev. Méd.-Chir.*, 1908.

simple. In our experience, this method of closure has never caused complications although Monod and Vanverts have asserted it may.

8. Suture of the Round and Broad Ligaments. It is often possible to suture together the pedicles of the round ligaments and sometimes even those of the broad ligaments, close to the median line in such a way as to form a support to hold the sutured peritoneal cul-de-sac and prevent secondary prolapse.

In case of pelvic abscess or if a suppurating tube is broken open during operation, especially if operation has been undertaken following puerperal infection, it will always be necessary to have the serosa open and to drain it with a large drain surrounded by four tampons soaked in warm horse serum.

9. Subperitoneal Drainage. The peritoneum having been closed as we have stated and the ligatures cut, two tampons soaked with warm horse serum are placed laterally on the stump of the broad ligament and two others are placed in front and behind to protect the bladder and the rectum, so that the drain will be placed between the four tampons (extraperitoneal drainage and tamponage). If the patient ought not be catheterized, a self-retaining catheter will be placed in the bladder. Vulvar dressing is done.

All the operation has taken place at the vaginal opening under control of the eye and hand, and without fixed clamps.

If the anteversion of the uterus appears too difficult because of adhesions, or if the adnexa do not seem sufficiently accessible, then it becomes necessary to make a total median vertical section of the uterus on both anterior and posterior aspects, and proceed on each half and its adnexa as has been indicated above (Muller and Quénu).

Postoperative Care. The tampons are removed and replaced at from forty-eight to seventy-two hours postoperative. The drain that has been left in place is expelled spontaneously at the time. After the fourth day the self-retaining catheter may be removed and two daily vaginal injections with physiological salt solution are given at very low pressure.

Patients may usually get up without difficulty on the seventh day. Several vaginal injections of silver nitrate, 1:1000, are used as a terminal measure.

After two weeks all that is seen at the base of the vagina is a transverse scar. If any uncicatrized granulations remain, they may be touched with the silver nitrate pencil.

CHANGES IN TECHNIQUE

In the technique described above I have used the improvements of various other surgeons with the addition of modifications of my own.

First of all and above all, I have been anxious to abolish the fixed clamps, which are painful and also dangerous from four points of view: clamping of ureters and intestines, hemorrhage, infection, and gangrene. Following the teachings of Martin and Tuffier, I have ascertained that ligations of the vessels can be made correctly and entirely secure.

Following Rouffard and Bouilly, I have sutured the peritoneum at the end of the operation, fully as easily if not more so, than is possible in certain abdominal hysterectomies.

The one remaining dubious point is the effect of having within the peritoneal cavity the cut surfaces of the two broad ligaments with their vascular ligatures, for since these stumps are not covered with peritoneum they are likely to cause adhesions of greater or less extent.

For this reason, I have added to the preceding modifications, causing the extraperitoneal localization of the stumps of the broad and round ligaments in such a manner that their extraperitoneal union would form a support against prolapse.

CRITICISM OF TECHNIQUE

If vaginal hysterectomy is performed according to this technique, what becomes of the arguments advanced against it?

1. Hemorrhage. Danger of hemorrhage from displacement or loosening of the fixed clamps no longer exists, and the ligatures give a surer hemostasis and one under visual control.

2. Dangers of Ascending Infection. Infection is avoided since no clamps protrude from the vagina; such clamps are hard to protect in a dressing opened several times daily to evacuate the bladder. Furthermore, the ligatures substituted for the fixed clamps eliminate gangrene of bruised tissues, the infection which may accompany removal of the clamps and secondary hemorrhages.

3. Clamping of Ureter, Omentum, and Intestine. Accidents due to clamping of these structures are avoided since the entire operation takes place at the vulva under visual and tactile control.

4. Absence of Peritonization with Consequent Adhesions. The closure of the peritoneum, one of the great arguments in favor of abdominal hysterectomy, is at least equally easy in vaginal hysterectomy. Monod and Vanverts believe that this closure, effected by Rouffard, Bouilly and Sanger, offers more inconveniences than advantages. They probably have in view the danger of leaving in the peritoneal cavity the non-peritonized broad ligament pedicles, which may act as the center of adhesions. Possibly they fear also a possible subsequent elimination of a catgut ligature. These objections disappear if the operator takes pains to exteriorize the tied-off broad ligament pedicles and to solidify them (after they have been covered with peritoneum) with the extremities of the sutured peritoneum, thus perfecting the peritonization of the pelvic cavity. There is no need to fear adhesions and, if a catgut suture should be eliminated, it would be in the vaginal cavity, outside of the closed peritoneum.

5. Postoperative Pain. The extremely painful period of the former procedure, during which the fixed clamps remained in place, disappears with this operative technique since no clamps are used. The tampons soaked in warm horse serum are extraperitoneal and their removal is not painful. The postoperative course is thus greatly simplified.

6. Lack of Space. It has been said that the vaginal route was narrow and lacked sufficient space. This is incorrect since it is only necessary to observe a vaginal hysterectomy following the above technique to know that the entire operation is performed at the vulva, with the abdominal viscera entirely outside the field of manipulation, well and easily protected by an isolating compress.

However, if in a given case the extreme smallness of the vulva were a real objection, it would be better to employ the abdominal route than to have recourse to the vulvovaginal debridement proposed by Chaput. Such a condition must be very rare for we have never encountered any real difficulties of this sort even in elderly nulliparae.

7. Removal of the Ovaries. A certain number of surgeons, anxious to conserve at least one ovary for its internal secretion effect, have favored abdominal hysterectomy. But this end is easily obtainable when the vaginal route is used. With the anteversion of the fundus uteri, the upper edge of the broad ligaments comes into view and it is perfectly easy either to include or exclude the ovary in the ligature.

8. Adhesions. The same applies to adhesions. In operation by the vaginal route they can be drawn outside, examined and sectioned between ligatures, if they are not too extensive. We have several times seen intimate intestinal adhesions whose destruction has twice involved opening the intestines. This latter was lowered on to a compress outside the peritoneum, sutured (Lambert) and replaced into the peritoneal cavity without accident.

There are cases in which a sclerosed base of the broad ligaments or low-lying fibromas hold the cervix immovable and prevent the lowering of the uterus. However, if such a uterus is approached by the abdominal route, it is certainly at least

as difficult to raise it as it would have been to lower it by the vaginal route.

In a case in which, because there was reason to fear this difficulty, I chose the abdominal route, it was found physically impossible to lift the uterus because of sclerosed adhesions and low-lying fibromas. I had to close the abdomen and begin again through the vaginal route, by which the uterus was lowered with sufficient ease. The postoperative course was uneventful.

In reality, none of the objections made to vaginal hysterectomy stand up under examination if the technique above reported is followed.

ADVANTAGES

On the contrary, this method presents important advantages:

1. Minimum of Shock. The operative shock is infinitely less than in abdominal hysterectomy, since the intestinal mass is neither exposed nor manipulated; it undergoes no traction whatever, since, from the beginning of the operation it is supported and isolated by a large compress which holds it up above the operative field. It is surprising to see patients on regaining consciousness show so little evidence of shock as to be almost normal.

2. Reduction of Danger of Infection. The danger of peritoneal infection is reduced to a minimum since all the operative work with our technique takes place extraperitoneally. Extirpation of suppurating adnexa is handier by the vaginal than by the abdominal route.

3. Simplicity of Postoperative Course. The patient is able to get up and walk at the end of the first week.

4. Absence of Abdominal Scar. Vaginal hysterectomy has the advantage of the absence of an external cicatrix, a fact which at the same time obviates any danger of ultimate hernia which, rare as it is, nevertheless exists.

5. Reduction of the Likelihood of Adhesions. The body of the intestines has not been manipulated and there is only one peritoneal cicatrix instead of two.

6. Reduction in Time. Vaginal hysterectomy is shorter than the abdominal by the length of time necessary for the suturing of the abdominal wall.

RESULTS

Our 123 consecutive cases are summed up in the following table:

Fibromas	75
Fibromas with non-suppurating adnexa	17
Fibromas with suppurating adnexa	11
Prolapsus	4
Neoplasms of cervix	6
Neoplasms of cervix with fibroma	2
Neoplasms of body of uterus	3
Neoplasms of body of uterus with fibroma	1
Neoplasms of body of uterus with adnexa	4
Total	123

In this total of 123 cases there has not been a single operative death; all the patients have been up on the seventh day and have had operative cures, without incident.

In a single recent case we have seen a double phlebitis. The patient's first symptom was a severe hemorrhage in which the red blood cell count fell to 1,020,000 in less than thirty hours, in spite of vaginal tamponage, ergot, calcium chloride, etc. Operation was put off for five months when the red blood cell count had gone up to 3,250,000. Before operation, because of fear of phlebitis which is more frequent in this type of case, subcutaneous injections of artificial serum were given and "proveinase" was administered by mouth. We are convinced that this double phlebitis would have followed equally after an abdominal hysterectomy, for histologic examination of the specimen showed, in a typical fibromyoma, numerous vascular lesions and extensive thromboses. Furthermore, the patient has since stated that her legs had troubled her for a month before operation.

The plea here made for vaginal hysterectomy has not been made to discredit abdominal hysterectomy, which is today a thoroughly proven operation of merit. Both operations have their precise indications.

INDICATIONS

1. Advanced Age. Cachectic Condition. Vaginal hysterectomy is the operation of choice because of its lack of operative shock in patients weakened by former hemorrhages, in elderly patients with weakened resistance and in cases of unilateral or bilateral infection of the adnexa.

2. Fibromas. The vaginal route is better in cases of fibromas of not excessive size, wherever located, and especially if they are situated low.

3. Total Prolapse after the Menopause. In elderly women with total prolapse, vaginal hysterectomy is the better operation for it permits the removal of a useless organ without shock, and assures a good support for the peritoneal cul-de-sac by the band formed by the suturing together of the round and if necessary the broad ligaments in the median line below the closed peritoneum.

CONTRAINDICATIONS

1. Excessive Volume. Every time that a fibromatous uterus presents a mass clearly too voluminous to pass without fragmentation by the lower route, vaginal hysterectomy should not be attempted. Fragmentation should be considered a poor method; it is too long and the loss of blood, always abundant, is difficult to gauge. Indisputably, in these cases the abdominal route is preferable.

2. Extensive Adhesions. Appendicitis. When the operator foresees the existence of multiple and extensive adhesions, notably between the right adnexa and the appendix with inflammation of the latter, the preference should unquestionably be given to an abdominal hysterectomy.

3. Myomectomy. In all cases where myomectomy is indicated, the vaginal operation is not to be chosen.

NEOPLASMS

It is impossible to draw any conclusions from our series of sixteen cases of neoplasm operated by the vaginal method. All that can be said is that all the patients showed operative recovery without shock. Of these sixteen cases we have eliminated two from the following discussion, the first is too recent (1927), and the other because it has been lost sight of.

Of the fourteen remaining cases, the oldest of which goes back to 1919 and the most recent to the beginning of 1925, six have died of recurrence or metastases within seventeen to thirty months after operation.

If there is nothing to be deduced from such inadequate data, it may at least be interesting to compare cases of neoplasm of the body of the uterus with those of the cervix. We have seven cases of cancer of the body of the uterus with two deaths by metastases, the first of the peritoneum two and one-half years after operation, the second by pleuropulmonary metastases in twenty-eight months.

We may conclude from this that the ultimate prognosis is much less grave in cancer of the body than in cancer of the cervix itself. We believe that tumors of the body of the uterus, if they are not too advanced, justify vaginal hysterectomy since they have much less tendency to invade the lymphatics and broad ligaments.

It would be interesting to be able to compare for tumors of the cervix the end results in cases of vaginal hysterectomy and of abdominal hysterectomy (Wertheim's operation).

As regards immediate prognosis, the advantage is certainly with vaginal hysterectomy since there is no operative mortality. However this advantage may not hold in the end results.

IODIZED OIL

AS A PYELOGRAPHIC MEDIUM*

C. H. NEUSWANGER, M.D.

WATERBURY, CONNECTICUT

DURING the past five years many of you have glanced at least casually at articles describing the use of iodized oil as a contrast medium. It has been used more or less successfully for the demonstration of cord tumors, for the injection of sinuses and for intratracheal injections.

It is my purpose now to describe briefly some experimental and clinical work on the use of this solution as a pyelographic medium.

There are numerous brands of iodized oil on the market, all very similar and consisting of an organic combination of iodine with an unsaturated fat, usually a vegetable oil. The amount of iodine varies from 10 to 40 per cent.

Many of you have had occasion to inject sterile oil into the ureter and have probably been impressed by the absence of pain following such an injection. With the hope of finding a better pyelographic medium and curious to know the result of an injection of this substance into the kidney, we experimented with it first upon female dogs; later we used it in the examination of our patients.

It is unnecessary for me to describe in detail the desirable properties of a pyelographic medium. Anything that will give a better pyelogram than is usually obtained or will reduce the frequent and often severe reaction that follows pyelography I am sure is desirable.

In making cystoscopic examinations on dogs, a small dose of morphine was first administered and then, with the animal held in position, the cystoscope was introduced and the ureters catheterized. This is much more difficult in an animal than in a patient because all of the structures are smaller. Phthalein tests were done on all the animals before and after the examination. They were kept under observation for several weeks, in many cases for several months, and no untoward results were observed to follow the use of this oil.

We used the iodized oil for making pyelograms both on experimental animals and in the examination of patients without any severe reactions and with no signs of toxicity. The greatest disadvantage encountered was the viscosity of the oil and this was reduced to a large extent by making an emulsion of it, using a sterile soap solution.

Our resulting roentgen-ray plates were good, and in some cases led to the diagnosis of a lesion where the injection of sodium iodide had failed. It was particularly useful in demonstrating the ureter.

DISCUSSION

DR. C. G. BANDLER. I believe that all of us are convinced that the most suitable pyelographic medium should be one that may readily be introduced into the blood stream and there absorbed without deleterious effect upon the patient. As has been frequently represented by Roger Graves and confirmed by all of us, sodium iodide, 12.5 per cent, is such a medium. However, I think that by utilizing the Woodruff occlusive catheter with the iodized oil as a medium, ureterograms may more properly be made, especially for visualization of strictures of the ureter or evidence of the peristaltic wave. I can see no advantage in the use of this material for pyelograms except in very stout patients. I agree with Dr. Neuswanger that his material should not be used as a routine procedure. The pictures we are obtaining with sodium iodide administered by gravity are very satisfactory and surely no other medium is so useful in the presence of an infected kidney.

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, October, 19, 1927

Although we do not make simultaneous bilateral pyelograms, I know this practice is becoming more common, but I surely wish to emphasize the warning against the use of iodized oil in such a procedure. I believe Dr. Neuswanger's material will be useful in injecting sinuses fistulae of the kidney to contrast it with a pyelogram done with sodium iodide. I am convinced that Dr. Neuswanger has presented to us another useful aid to urologic diagnosis.

Dr. Neuswanger. (In reply to the discussion and questions which followed the reading of his paper.) Dr. Furniss asked about the oil mixing with the urine. There was some difficulty encountered because the oil did not mix thoroughly with the urine and therefore the pelvis was not completely filled. We overcame this to some extent by making an emulsion of the oil, mixing it with a sterile soap solution. This diluted the oil somewhat. Regarding possible embolism, we thought of that and injected the iodized oil directly into the vein of several animals and found that it caused multiple small emboli in the lungs. This, however, did not kill the animals and in time was absorbed with no apparent ill effects.

A question was asked, how is the oil prepared? The oil we used is called iodopin. A description of the chemistry of this solution appeared in an article by Winternitz back in 1896. However, we have been unable to prepare this material even with the help of this description. There is apparently some process which is unknown to us, although our chemist has been working upon it.

A question was asked as to the amount of oil used and how it was injected. You may criticize me when I say that I employed the syringe method and depended upon the sensation of the patient to judge when the injection was complete. I feel that 5 c.c. of the oil can be injected safely and usually gives a good picture. To go beyond this amount requires great care.

In reply to the checking up of patients, we did only routine phthalein and blood chemistry tests and from this did not observe any reductions due to the use of the oil. There certainly is room for more careful checking up on the effects of the use of this solution.

One of the doctors mentioned using 40 per cent of sodium iodide on his patients and injecting only small amounts. I would refer him to some experimental work done by Davidoff and Graves on rabbits a few years ago in which they proved rather conclusively that any solution of sodium iodide above 12 or 13 per cent is distinctly damaging to the mucous membrane.

In conclusion I do not urge you to replace the sodium iodide with this solution but I believe it has distinct advantages, especially in the injection of the ureters, for I am thoroughly convinced that it is perfectly safe. Further experimental work upon its use is very desirable. We have been using it for the past three years.

THYROID ADENOMATA

THEIR VARIETIES AND NATURE AND SOME SURGICAL CONSIDERATIONS APPERTAINING TO THEM

LAMBERT ROGERS, F.R.C.S. (EDIN.)

CARDIFF, WALES

OBSERVATION of a number of patients with adenomatous goiter, of their thyroid glands when exposed at operation, and of the gross and microscopic appearances of the portions of thyroid resected has convinced me that it is desirable to revise the common conception of the nature of thyroid adenomata.

The commonest type of goiter which comes to operation in this district is the adenoparenchymatous or nodular colloid variety which may or may not be associated with thyrotoxicosis or productive of pressure at the root of the neck, but which in any case is an irregular and unsightly tumor almost invariably occurring in women and causing them much distress (Figs. 1, 2, 3, 4).

Adenoparenchymatous goiter is most often seen in women thirty or forty years old and when toxic, constitutes the commonest variety of the "formes frustes," the atypical variety of Graves' disease. It usually affects both lobes of the thyroid but cases occur in which the disease is confined to one lobe only.

NATURE OF THE NODULES

The encapsuled tumors (nodules) found in the common variety of adenoparenchymatous (nodular colloid) do not appear to be true adenomata in the sense of neoplasms, but rather degeneration nodules in which the thyroid vesicles are distended with colloid while their lining epithelium is flattened. The formative process probably takes place somewhat in the manner suggested below.

Owing to causes at present imperfectly understood but possibly of the nature of certain alterations in iodine metabolism, colloid distention of vesicles takes place in groups, intervening between which other vesicles are compressed and distorted until ultimately they form capsules around each of the growing nodules (Fig. 5). The distorted vesicles are the earliest sign of capsule formation. Fibrous tissue forms in relation to them and gradually increases in amount so that the capsule develops concurrently with the growth of the nodule (Fig. 6). The older and larger the nodule, the more easily will it shell out of its bed in the thyroid.

Rienhoff[1] has described a process of "involution" occurring in the thyroid as a result of administering iodine to patients with Graves' disease. The characteristic features of this disease, papilliferous vesicles with a columnar proliferating epithelial lining and little colloid, are replaced by a flattened epithelium with distended vesicles devoid of papillae. If sufficient iodine is given the vesicles distend and nodules of colloid form.

The nodules in adenoparenchymatous goiter resemble Rienhoff's involution nodules and in my opinion are areas of degeneration which have become encapsulated in the way described, and are not therefore true blastomata. It appears to be desirable, therefore, to refer to these nodules as "pseudo," colloid or vesicular adenomata in contradistinction to fetal adenomata.

FETAL ADENOMATA

These tumors differ in several respects from "colloid nodules." Fetal adenomata may be large in a patient of seventeen (Figs. 7 and 8). They appear much more solid than "colloid nodules" and on section present different appearances according to their age. Some are rather hard, solid,

brownish-red tumors. These are usually multiple and are the typical encapsulated tumors seen in young girls, while others (Fig. 9) found in women of thirty or forty are softer and appear waxy yellow, streaked with red hemorrhagic areas.

Fig. 1. Adenoparenchymatous goiter confined to left lobe of thyroid. Patient aged thirty-six.

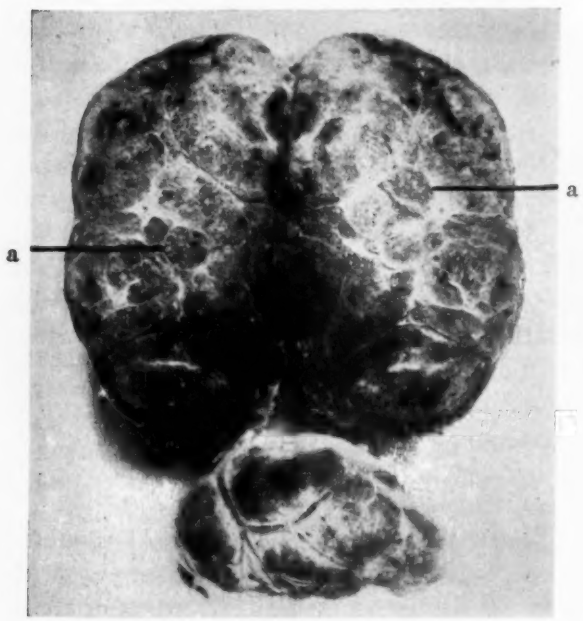

Fig. 2. Appearance of adenoparenchymatous goiter removed at operation from a woman aged forty-four. This patient suffered from auricular fibrillation and therefore the operation was performed under novocaine anesthesia. Note the encapsulated nodules, a.

Figures 10 and 11 illustrate the hard and waxy varieties respectively and Figures 12 and 13, their histological appearances,

Fig. 3. Specimen removed from patient of Figure 1. Removal by resection-enucleation. Note atrophic thyroid tissue in front of nodules, and line of section made to display condition of gland.

which will be seen to simulate closely immature thyroid tissue (Figs. 14 and 15).

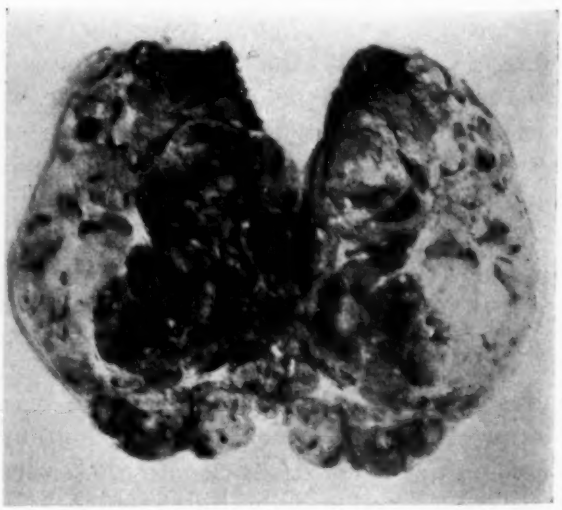

Fig. 4. Same as Figure 3, opened out along line of section shown.

It is possible that the mucous adenoma described by F. T. Paul[2] and other writers is really an old standing fetal adenoma of this waxy character.

These waxy tumors have been mistaken for malignant disease of the thyroid while the converse mistake has resulted in the description of numerous cases since the first recorded by Cohnheim[3] in 1876, of what has been called "benign metastasiz-

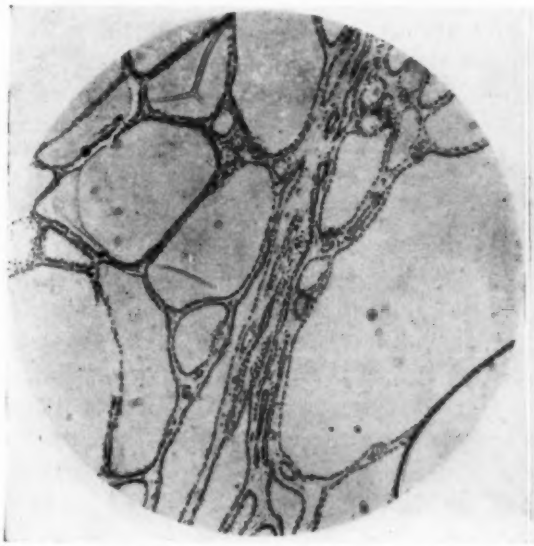

Fig. 5. Microscopic appearance of section of thyroid removed at operation in case of adenoparenchymatous goiter. Compression of vesicles by colloid distention of those adjacent is resulting in an early stage of capsule formation around a "colloid nodule."

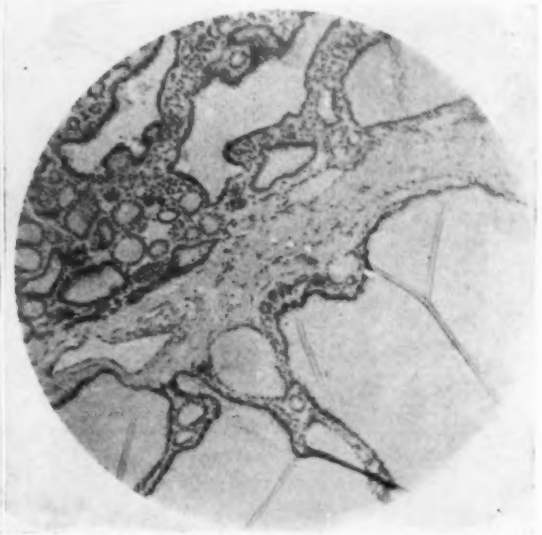

Fig. 6. Another section of specimen of Figure 5, showing an older nodule with a later stage of capsule formation.

Fig. 7. Multiple fetal adenomata in a girl aged seventeen.

Fig. 8. Patient of Figure 7 nine days after bilateral resection-enucleation. Dark coloration of skin due to picric acid.

ing goiter," a condition which Simpson[4] has recently shown to be true carcinoma of the thyroid. The characteristic features

Fig. 9. Single fetal adenoma in right lobe of thyroid in woman aged twenty-eight.

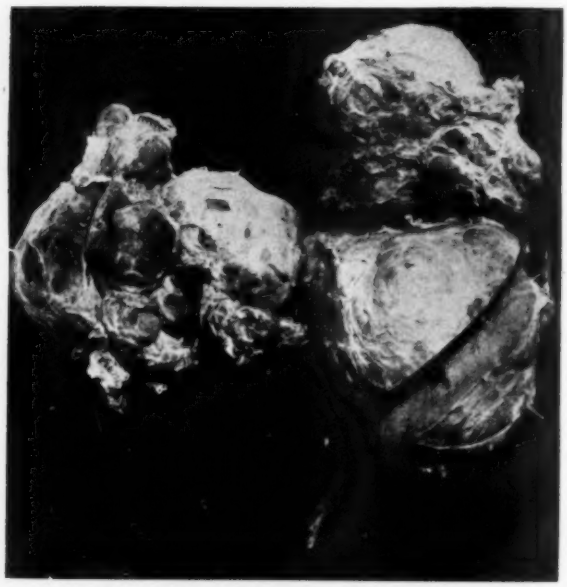

Fig. 10. Multiple fetal adenomata removed at operation from patient of Figure 7. On section these tumors were found to be of the hard, red-brown variety.

of the fetal adenomata as outlined above are, however, quite distinct.

Fetal adenomata are apparently true blastomata arising from the interstitial tissue of the thyroid, probably from the cell rests described by Wölfler[5] in 1883. They may therefore be described as "true," interstitial, or fetal adenomata.

CLASSIFICATION

A thyroid adenoma has been described as "an encapsuled tumor of the thyroid gland containing vesicles of the same character as those which make up the normal gland."[6] About 1900, however, Sir James Berry[7] pointed out that the majority of thyroid cysts (bronchoceles) (Fig. 16) arise from a breaking down of the contents of solid adenomata and are therefore in reality cystadenomata.

Thus it came about that the adenomata were regarded as either solid or fetal, or cystic. Later when it was found that certain of them differed from fetal tumors in containing well developed acini, these were referred to as colloid adenomata.

In view, however, of the suggested pathogenesis of the two large groups of encapsuled tumors, it appears desirable to

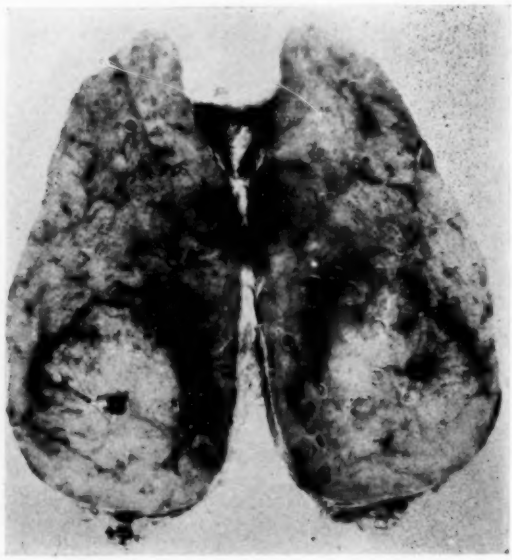

Fig. 11. Fetal adenoma removed at operation from patient of Figure 9. Tumor was of waxy appearance containing hemorrhages.

differentiate thyroid adenomata into two groups—the true, fetal or interstitial, and the pseudo-adenomata, colloid nodules or

vesicular encapsuled tumors—such terms having regard for the nature and probable origin of the tumors.

may be riddled with the colloid tumors or more rarely these may be confined to one lobe only as in Figure 1.

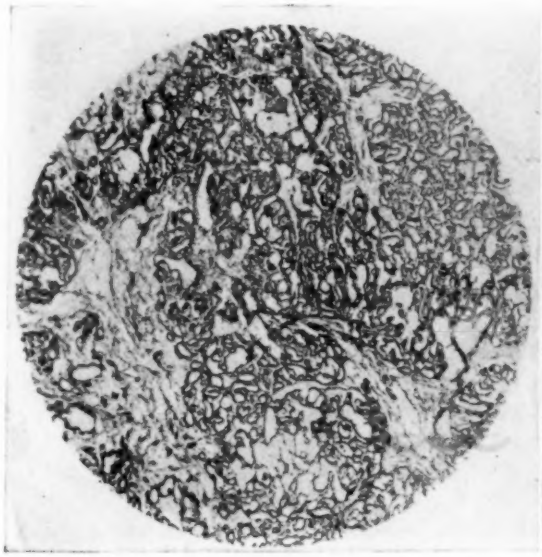

Fig. 12. Microscopic appearance of section of fetal adenoma removed from patient of Figure 7.

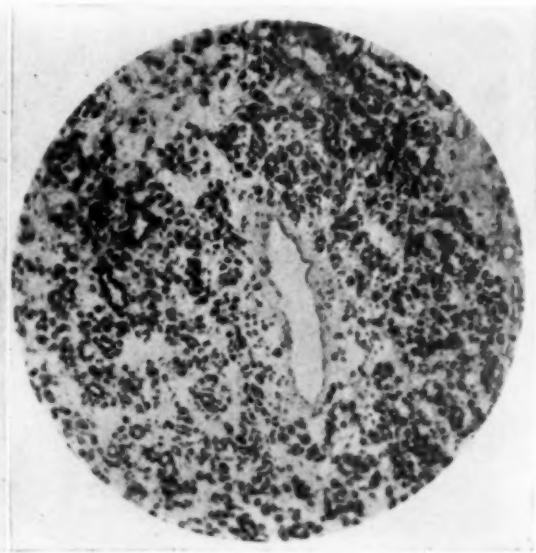

Fig. 13. Microscopic appearance of section of fetal adenoma removed from patient of Figure 9.

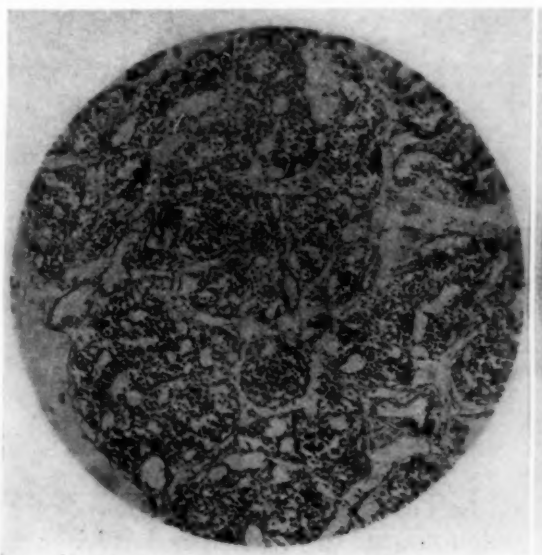

Fig. 14. Microscopic appearance of section of thyroid of a full time fetus.

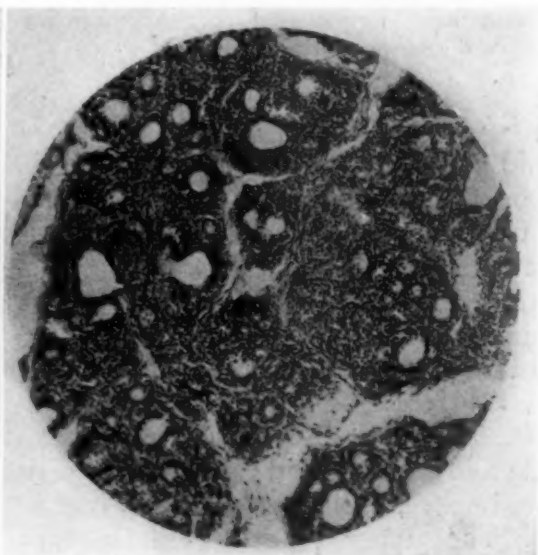

Fig. 15. Microscopic appearance of section of thyroid of a child two days old.

Cysts may arise from a central necrosis in either variety but more commonly from fetal tumors.

SOME SURGICAL CONSIDERATIONS

Fetal adenomata occur either singly or in numbers whereas colloid nodules are always multiple. Both lobes of the thyroid

Resection-enucleation (Fig. 17) offers the best way of dealing with single or multiple adenomata. The facility with which this procedure can be carried out depends upon the fact that the encapsuled tumors tend to come forward in the gland. They are covered by thinned out, atrophic, thyroid tissue beneath the fibroue

capsule of Kocher. The object of resection-enucleation is to remove the atrophic tissue in front of the tumors along with them and shell them out of their bed behind so that a strip of thyroid remains in front of the recurrent laryngeal nerve and parathyroid bodies and protects these structures from damage.

Fig. 16. Single cyst removed from left lobe of thyroid of man aged forty-nine. Upper half contains coagulated colloid.

A collar incision is made over the most prominent part of the goiter and flaps containing skin, superficial fascia and platysma retracted upwards and downwards. After laterally retracting the small prethyroid muscles and opening the perithyroid space, the lobes are dislocated in turn. The upper pole of one is then ligated and the resection-enucleation performed, the cortical vessels being secured prior to dividing the gland substance. It is unnecessary to ligate the inferior thyroid artery separately. If necessary the same procedure is then carried out upon the other lobe. In toxic cases the greater part of each lobe is removed in this way.

If auricular fibrillation is present the operation is performed under novocain analgesia but otherwise nitrous oxide and oxygen with, if necessary, a little ether is the anesthetic of choice.

I have found the technique which I have briefly outlined above very satisfactory for dealing with thyroid adenomata and the results have been most gratifying.

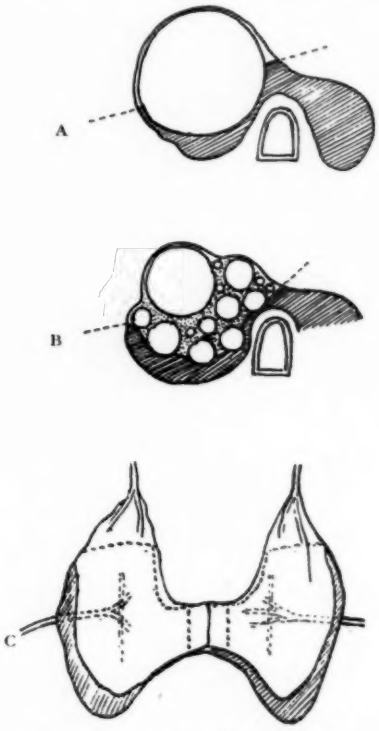

Fig. 17. Diagrams to show planes of division of thyroid for resection-enucleation for adenomata. A and B, cross sectional; C, anteroposterior view. A, for single adenoma; B, for multiple tumors. Note relative positions of inferior arteries and recurrent nerves in C, which is a drawing of a dissection made by the writer.

SUMMARY

1. There are two varieties of thyroid adenomata: (*a*) true, interstitial, or foetal, and (*b*) pseudo, vesicular, or colloid—"colloid nodules."

2. These terms have regard for the nature and probable origin of the tumors.

3. The fetal tumors occur in young subjects and are hard encapsuled bodies, either single or multiple. They are true blastomata.

4. The colloid nodules occur in older women. They are always multiple. They are not true blastomata but degeneration

nodules which become encapsuled by a process which is here described.

5. Either variety of adenoma may become cystic.

6. Adenoparenchymatous goiter is very common. It almost invariably occurs in women. This form of goiter may be toxic ("formes frustes") and may produce pressure at the root of the neck. One or both thyroid lobes may be affected.

7. Adenomata, whether occurring singly or in numbers, are treated by resection-enucleation, the essential details of which are included herein.

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CASE REPORTS

CASE REPORTS BY EDWARD J. DONOVAN, M.D.

NEW YORK

TRANSPERITONEAL NEPHRECTOMY*

T. M. This child was admitted to the surgical service of Drs. Martin and Downes at St. Luke's on April 10, 1927, at the age of four years, complaining of pain in the right lower quadrant for past two days with vomiting for past twenty-four hours.

Present illness: Two days ago the patient was taken rather suddenly with a severe pain in the right lower quadrant of abdomen. Pain continued through the day, and on the next day, he vomited very frequently. He had had no urinary symptoms.

Past history: He had a similar attack about three months ago. The attending physician said it was acute appendicitis and "froze it out." In the interval the child's health has been poor, no appetite, constipated and often complained of pain in the right side. Mother has known for the past two years that the child had heart trouble. Was operated on for inguinal hernia in another hospital two years ago. No history of being a blue baby.

Family history: Negative.

Physical examination: The physical examination revealed a poorly nourished white boy, four years of age, looking acutely ill. He seemed to be in pain, very toxic and dehydrated to a marked degree. Pulse was very rapid and there was marked pulsation of the vessels of the neck. Examination of the lungs was negative. Heart diagnosis by pediatrists was congenital heart, probably interseptal defect.

Abdomen was quite distended, rigid over the whole right side but rigidity and tenderness were most marked in the right lower quadrant where there was an acutely tender mass extending from the right iliac fossa almost to the umbilicus mesially and upward to the region of the right kidney. Child screamed when this side was touched so a satisfactory examination was impossible.

Rectal examination showed a tender mass on the right side apparently continuous with that of the abdomen. No blood on the examining finger.

Diagnosis: appendix abscess. Due to the fact that this child seemed so ill, it was thought best to drain the abscess through a McBurney incision and not try to remove the appendix unless it came very easily.

White blood cells, 20,700; polymorphonuclear leucocytes, 85; lymphocytes, 15; temperature, 101°; pulse 120. Urine was negative except for a very faint trace of albumin.

Operation: Under ether anesthesia when the abdomen could be palpated much more thoroughly, the true extent of the mass was revealed. The diagnosis of hydronephrosis was considered for the first time.

Abdomen opened through a right rectus incision 4 in. long showed the cecum and a normal looking appendix thrown forward by this retroperitoneal cystic tumor extending from the right iliac fossa to the under surface of the liver. The question then arose that if this was a congenital heart, might not this be a congenital hydronephrosis and perhaps the other kidney not so good. It felt quite normal so we proceeded, incising parietal peritoneum outside cecum for a distance of 4 in. thereby exposing kidney which was a very thin walled sac, tense, with practically no kidney substance recognizable.

Because of its size it was aspirated of about 15 ounces of bloody urine before any attempt was made to remove it. The vessels of the pedicle were isolated and tied separately twice. The ureter which was about normal size was ligated and cut and the kidney removed. The cecum was replaced and the parietal peritoneum sutured to it where it had been incised to expose the kidney. The abdomen was closed in layers without drainage.

Pathological report: Diagnosis, hydronephrosis. The obstruction seemed to be at the ureteropelvic junction where the lumen was completely obliterated.

* Read before Section of Surgery, New York Academy of Medicine, December 2, 1927.

Convalescence: The child stood the operation well, and on the next day took his fluids easily, putting out 18 ounces of urine. On the second day he did not appear to be so well, as he was drowsy, vomited several times and put out only 5 ounces of urine. The blood chemistry taken on this day was normal. His fluids which had been forced were almost doubled by clyses and rectal drip and from that time on the daily output was between 18 and 27 ounces. He developed a slight wound infection on his eighth day but this cleared up quickly. He improved rapidly and was discharged to the country on his twenty-sixth postoperative day, being kept in the hospital this long to improve his general condition.

Follow-up: It is now nine months since operation, and the child is doing very well. He is under treatment in the cardiac clinic. He has gained considerable weight, eats well and is quite free from symptoms.

Points of interest:

1. The congenital heart.
2. The possibility of this being a congenital hydronephrosis.
3. The difficulty o af differential diagnosis until anesthetization.
4. Temporary cessation of function of left kidney after operation.
5. The attack three months ago was probably the same condition, and the acute symptoms of the last attack might well have been due to hemorrhage into this hydronephrosis.

GANGRENOUS INTUSSUSCEPTION*

K. D. This baby was admitted to the Babies Hospital August 9, 1927, at the age of four months with a history of vomiting for past two days, frequent bowel movements for two days and blood and mucous passed by rectum for past two days.

Family history: Negative.

Past history: Only child, full term, normal delivery, birth weight 7 lbs., 4 ozs. Breast fed to date. No previous illness.

Present illness: Onset rather gradual. About fifty-three hours before admission mother first noticed that the baby was very fretful and irritable but did not think she was very ill. The next day the baby seemed very sick, vomited, cried all day and seemed to be in pain. Blood and mucous appeared in the stool for the first time. A physician was called who prescribed something for the baby's bowels but this did not seem to give relief. The condition of the child grew progressively worse and the parents brought her to the Babies Hospital. While in the admitting room, the baby passed a stool which was practically all blood and mucous.

Physical examination: Well developed, well nourished white female infant, four months of age, crying as if in great pain. Both thighs flexed on the abdomen. The examination was essentially negative except for the following:

1. Sausage shaped mass passing across abdomen just at the umbilicus from one iliac fossa to the other. There was rigidity over lower abdomen on both sides, more marked on the right. No visible peristalsis and only slight abdominal distention.

2. Rectal examination revealed a mass apparently continuous with that of the abdomen practically filling the whole rectum. This mass had the typical feel of an intussusception.There was no blood on the examining finger.

Operation performed about one hour after admission with the diagnosis of intussusception.

Abdomen opened through a right mid-rectus incision 4 in. long and an intussusception found involving terminal ileum and the whole colon. With a hand in the abdomen and pressure behind the apex of the intussusception, reduction as far as the ascending colon was accomplished but with difficulty. The mass was delivered into the incision and reduction continued to a point in the terminal ileum where it became impossible by all known means to complete it. The cecum was then opened for a distance of 3 in. in the external longitudinal band, and it was then evident why the intussusception was irreducible. There was a section of the ileum intussuscepted into the ileum and twisted on its long axis once. This ileum (about 4 in.) was completely gangrenous. The intussusception was then reproduced by drawing more of the ileum into the cecum through the ileocecal valve until good looking intestine was obtained. A rubber-covered clamp was placed across this and the gangrenous gut removed, thereby leaving about one and one-half inches of normal ileum intussuscepted inside the cecum. The cut edges were then whipped over with a continuous chromic and the clamp removed. A second continuous chromic united the intussuscepted ileum for a distance of ¾ in. from this cut edge. The line of anastomosis was then

* Read before Section of Surgery, New York Academy of Medicine, December 2, 1927.

drawn out through the ileocecal valve for a distance of about 3 in. It was then reinforced with several sutures of interrupted chromic. The cecum was closed with three rows of continuous chromic, and the abdomen was closed in layers without drainage.

Progress postoperative: Convalescence was most uneventful. She was given a transfusion of whole blood (80 c.c.) about two hours after the operation and two glucose clyses during the day. Nothing by mouth until the next day when she was fed breast milk from a bottle every three hours. After the operation the bowels moved three times that day, the stools each time being entirely blood and mucous. On the next day she had six stools showing considerable old blood and mucous with very little fecal matter. On the third postoperative day she had a normal bowel movement, and the bowels from then on moved normally every day.

The temperature which was normal on the third day rose a little on the fifth day, and twenty-four hours later a forceps was inserted into the upper angle of the wound which freed about one-half ounce of colon pus. Her temperature returned to normal the next day and remained so throughout the course of her convalescence. There was very little drainage from the wound, and she was discharged on the fifteenth postoperative day with the wound completely healed and in excellent condition.

Follow-up: It is now four months after the operation, the child is eight months of age, weighs 16 lbs., is developing normally and is quite well with her wound soundly healed.

CHRONIC INTUSSUSCEPTION*

M. G. This child was admitted to the Babies Hospital on July 10, 1927, at the age of fifteen months with the following history:

Present illness: Child had always been well until two months ago when she was suddenly seized with a severe abdominal pain which "doubled her up." She vomited very shortly afterward, and a physician who called said it was a cold and advised a glycerin enema. Blood was passed with the enema and very little fecal matter. Pain seemed to be better the next day but child was very irritable and restless and vomited several times. From that time until she was admitted to the Babies Hospital she had had daily enemata showing some fecal matter and a great quantity of mucous in return. She also showed progressive decline, was listless, irritable, constipated and vomited frequently. It was impossible to get her to take food, and she lost five pounds in weight. She seemed to be continually suffering from abdominal pain. Six doctors had seen her during this time, each one making a different diagnosis but no one helping her. The symptoms seemed to be more acute during the past two weeks and two days ago, the mother noticed for the first time that the child's rectum protruded for at least two inches after the enema. For forty-eight hours before admission the child had vomited everything taken.

Physical examination: Female Italian child, fifteen months of age, looking chronically ill, pale, dehydrated, very much emaciated, irritable and apparently in pain. She continually rubbed her hands over her abdomen. Examination revealed the following additional facts: Hemoglobin, 50 per cent; abdomen quite distended with intestinal coils standing out in step-ladder pattern; peristalsis visible; rigidity not very marked but more evident over the right lower quadrant; tenderness generalized over both sides of the lower abdomen. There is a sausage-shaped mass extending across the abdomen (at about the level of the umbilicus) from one iliac fossa to the other. This mass is not particularly tender and slightly movable.

Rectal examination showed a mass practically filling the rectum apparently continuous with the abdominal mass and having the characteristic feel of an intussusception. There was no blood on the examining finger.

During the induction of the anesthetic the mass of intestine came through the anus for about two inches.

Operation: The abdomen was opened through a right mid-rectus incision 4 in. long, revealing an ileocolic intussusception extending as far as the rectum. By pressure of the hand behind the apex of the intussusception, reduction as far as the ascending colon was accomplished intra-abdominally with great ease. The ascending colon was delivered into the wound so that the remainder of the reduction might be done under direct vision. The completion of the reduction was very simple, but when the ileum came out it was found to be bent rather acutely upward and attached to the wall of the colon for a distance of one and one-half inches

* Read before Section of Surgery, New York Academy of Medicine, December 2, 1927.

by very dense well-organized adhesions. These could not be separated by pressure and had to be done by sharp dissection, allowing the ileum to return to its normal position. The abdomen was then closed in layers in the usual way.

Progress: Child made an uneventful recovery and was discharged to the country on the sixteenth day with the wound completely healed by primary union. She was given a transfusion of 185 c.c. of whole blood after the operation. At the time of her discharge she was taking her food without trouble and her bowels had moved normally each day.

Follow-up: Returned after two months in the country, weighing 6 lbs. more than when she went there. It is now five months since operation and the child has gained in weight and strength so that she is now quite normal and free from symptoms. Her incision is soundly healed.

Points of interest:

1. Duration of child's illness (2 months of recurring intussusception).
2. Progressive emaciation (loss of 5 lbs. in a child of fifteen months.)
3. More acute symptoms for last two weeks.
4. Prolapse of the rectum (so-called in the history) noticed by the mother two days before admission.
5. No blood in the stools at any time except at onset of illness.
6. Ease with which reduction was accomplished.
7. Gain of 6 lbs. weight in two months postoperative.

FRACTURE OF BOTH BONES OF THE LEG*

William F. MacFee, M.D.

NEW YORK

Case 1. Mrs. E. McM., aged twenty-six, white. On July 24, 1926, she tripped while going down subway steps and fell with left leg doubled under her. She was removed to a hospital where a cast was applied to leg. She remained in the cast until August 2 when she was admitted to St. Luke's Hospital.

On examination the left leg was encased in plaster of Paris; a window had been cut over lower leg, medial surface, to permit dressing of a wound which probably was caused by a compounding of the fracture. Removal of the cast revealed marked swelling and discoloration. Clinically the alignment seemed good. Measurements disclosed shortening of left leg one full inch as compared with the right. Roentgenogram taken on admission showed a long oblique fracture of tibia extending upward from about one inch above internal malleolus with well defined overriding of fragments. The fibula was fractured at a higher level with overriding. There was posterior bowing of tibia at point of fracture.

Because of the type of fracture some form of traction treatment seemed advisable. A Steinman pin introduced transversely through the os calcis was considered the method of choice in this particular case. By means of calipers attached to the ends of the pin a weight of 25 pounds was applied as traction. This was done August 7th, two weeks after injury. For the first two or three days there was considerable dull pain in heel. This was controlled by opiates. The patient was then relatively comfortable until about three days before removal of pin, twenty-eight days later. After four days of traction the weight was reduced to 20 pounds. Between the second and third weeks the weight was further reduced to 15 pounds. A roentgenogram taken August 13th showed considerable improvement in position, and measurements showed relative shortening of ¼ inch. There was beginning union. Roentgenogram on September 3rd showed considerable union with satisfactory position, length about the same. By this time patient had grown quite restless complaining of pains in shoulders, back, and neck and of "muscle ache" in injured leg. It was thought safe to remove traction. Under gas-oxygen anesthesia the pin which had become quite loose was removed and light posterior and lateral moulded plaster

* Read before Section of Surgery, New York Academy of Medicine, November 4, 1927.

splints were applied. Patient had had twenty-eight days of traction.

She was discharged from the hospital on September 13th. A light splinting was continued for four weeks, patient beginning to bear a little weight on left leg about three weeks after discharge from hospital.

Measurements made to-day show that she has possibly ¼ inch shortening of left leg as compared with right.

Case II. J. R., male, forty-four, white, farmer. Admitted to St. Luke's Hospital on August 4th, 1925. He gave a history of having been struck by an automobile one month previously (July 4, 1925). Immediately after the accident he was taken to a hospital where casts were applied to both legs for fractures. He remained in the hospital three weeks and then was at home one week before coming into St. Luke's Hospital.

On examination both legs were encased in heavy plaster casts including the knee joints and the foot. The cast on the right leg was reenforced with mesh wire. The left leg was discolored from the knee to the ankle. The upper leg was edematous. Just below the patella there was irregularity over the anterior surface of the tibia and some abnormal mobility. The right leg was markedly swollen and discolored throughout; near its middle there was a definite break in continuity of the tibia with false motion so great that fracture of the fibula seemed likely. Over the external malleolus, the tendo Achilles, and in the prepatellar region there were deep ulcerations extending into the subcutaneous tissue. There was a wound over the fracture point of the tibia which in all probability extended down to the bone.

The roentgenogram on admission reported long oblique comminuted fracture of upper one-fourth of left tibia entering knee joint. The right leg showed fractures of the middle third of tibia and fibula with large comminuted fragments. There was some overriding with rather poor alignment.

Because of deep pressure sores and poor position the problem of management was difficult. To overcome shortening it seemed that some form of traction was necessary. Adhesive straps were out of the question because of ulcers. It was decided to use a Steinman pin, realizing, however, that the danger of infection from neighboring ulcer of external malleolus was considerable. The pin was inserted August 7th and thirty pounds weight applied. Primary discomfort was controlled with morphine. Roentgenograms taken August 12th and again on August 21st showed improved position and the latter showed some callus formation. The pressure ulcers in the meantime had shown relatively little improvement. The period between August 21st and 28th was marked by increased swelling and pain about the right heel, and on August 28th the pin was removed. Moleskin adhesive straps with light traction were substituted.

Roentgenograms taken on September 17th and again on September 24th showed that there had been at least a partial loss of the previous gain in length. Union, however, seemed to be going on at a good rate. November 2nd a light cast was substituted for traction. Crutches were allowed November 7th. By November 25th the infection of the heel had almost cleared up but there was considerable edema and the ulcer over tendo Achilles persisted.

Patient was finally discharged January 21, 1926, at which time he had fair union but still used crutches. Ulcer over Achilles tendon and posterior aspect of heel still unhealed. Hole through heel had closed.

At the present time measurements show legs to be of equal length as measured from anterior superior spine of ilium to tip of internal malleolus. The ulcer over insertion of right tendo Achilles is not entirely healed.

DISCUSSION

Dr. Fenwick Beekman. We have come to the conclusion that skeletal traction should be used in all cases of fracture of both bones of the leg where the fracture is of the long spiral type, comminuted or compound. We have noted that the Steinman nail through the os calcis often produces osteomyelitis and we therefore have been placing the nail above the os calcis so that it is outside rather than through the bone. Fractures cannot be kept reduced without proper traction.

Dr. MacFee. Of the cases in which I have used the Steinman pin, osteomyelitis of the os calcis has occurred in one other beside the man shown here tonight. In these two cases the osteomyelitis apparently came from nearby infected wounds. In clean cases, I have never seen infection follow the use of the Steinman pin. Wounds made by the pin usually heal within two weeks.

GASTRIC ULCER*

Henry W. Cave, M.D., F.A.C.S.

NEW YORK

CASE REPORTS

CASE 1. Age, thirty-five. Admitted to Roosevelt Hospital, May 6, 1921.

Family History. Father living and well at sixty-eight; mother died of pneumonia at sixty-nine; brother living and well at twenty-four; no tuberculosis, no heart or kidney trouble, no nervous diseases; mother had one miscarriage.

Personal History. General health always excellent; no children's diseases, no typhoid; never any illnesses whatsoever; denies venereal diseases; bowels constipated; has had to take catharsis.

Present Illness. Began ten years ago (1911). While patient was leaning over he vomited about one quart of blood; no previous occurrence; never had before this incident any pain or premonition of this distressing experience; was in bed about three weeks; treated medically for three months; no pain following the hematemesis for five years, then pain of definite character started in immediately after eating, as a rule usually an hour after the intake of food; this pain has during the past year become more severe and more constant; has noticed for some time that stools were dark and tarry in character, also following defecation a bit of blood comes from rectum. One week ago patient had a spell of vomiting blood, second in ten years; felt extremely weak, fainted.

Physical Examination. A fairly well developed, fairly well nourished man who looks wasted, pale and weak; skin sallow in appearance; head negative; heart and lungs normal throughout.

Surgical Condition. Abdomen symmetrical, no visible masses or peristalsis; definite tenderness in region of pylorus of stomach; no masses felt; liver not enlarged; nothing of note elsewhere in abdomen.

Extremities. Negative.

Urine. May 7, 1921, color, st.; appearance, clear; reaction, ac.; specific gravity, 10.28; few white blood cells.

Blood Analysis. May 7, 1921, red blood cells, 4,208,000; white blood cells, 7,550; hemoglobin, 50 per cent; polys., 74 per cent; lymp., 26 per cent. On May 13, 1921, red blood cells, 4,096,000; hemoglobin, 85 per cent. On May 9, 1921, n.p.n., 43.70; n.p.n. nitrogen, 21.40; creatin, 1.20; uric acid, 3.20; sugar, .11.

Ewald Test Meal. May 11, 1921. Total hydrochloric acid, 60 per cent; free hydrochloric acid, 40 per cent.

Roentgenogram Report. June 2nd, 1921. The stomach is of an orthotonic type with definite interrupted peristalsis and there is a distinct niche or filling defect on the lesser curvature surface rather high up in the body of the stomach. At six hours the stomach is completely evacuated, a small trace of barium still remaining in the niche.

Diagnosis. Penetrating gastric ulcer involving the lesser curvature and anterior surface of the stomach.

Operation. June 5, 1921. A high left rectus incision was made approximately five inches in length, hockey stick at the upper angle. Incision was made about an inch and a half from the midline. Peritoneum was opened, the stomach presented in the wound. By very gentle traction downward the stomach was brought down without difficulty, and there on the anterior surface midway between the cardia and pylorus near the lesser curvature, in fact about 1 cm. from the lesser curvature, was a hard crater-formed ulceration. The crater of the ulcer admitted easily the tip of the index finger and about this an induration extended approximately 1½ cm. in every direction. Removal in the usual way of the appendix which was found to be kinked on itself by a short mesentery with a bulbous tip. Appendix excised and stump cauterized, inverted purse string, whip over catgut. In each hemisphere of the anterior wall of the stomach about the ulcer, four traction sutures of fine black silk were placed; the cautery was then used to ream out the ulcer. Great care was taken not to puncture through to the posterior wall with the cautery. There was practically no soiling. Closure of this opening was made with three tiers of sutures continuous, first fine chromic

* Read before Section of Surgery, New York Academy of Medicine, December 2, 1927.

gut, linen and plain catgut. A gastroenterostomy was then done. The posterior and anterior tier of linen, mucous membrane and wall with fine chromic gut and over this interrupted plain catgut. The opening from the stomach into the jejunum admitted two fingers easily. The rent in the mesocolon was sutured to the stomach side of the gastroenterostomy with interrupted plain catgut. The head of the pancreas, gall-bladder, liver and spleen were felt and found to be normal. No enlarged lymph nodes felt. Closure was made with continuous double No. 2 catgut, peritoneum closed with interrupted fine catgut. For the rectus muscle continuous double catgut No. 2 to fascia of rectus muscle, interrupted silk worm gut for subcutaneous tissue and skin.

Roentgenogram Report. November 21, 1927. A short series of plates made of the stomach show a patent enterostomy stoma with apparent occlusion of the pylorus. The stomach is completely empty at six hours.

Ewald Test Meal. November 27, 1927. Total hydrochloric acid, 19 per cent; free hydrochloric acid, none.

Case II. Merchant, sixty-three years old.

History. Admitted to Roosevelt Hospital April 3, 1925, discharged April 22, 1925. He has not lost weight; no vomiting; no bloody or dark, tarry stools; has merely suffered from pain in upper abdomen which has been a constant factor in his illness.

Complaint. Patient complains of pain in the region of the stomach about one-half hour after meals, eruptation of gas and general abdominal distress.

Physical Examination. Patient is a well nourished, well developed man who does not look ill; heart and lungs are normal throughout; abdomen negative; no mass or masses could be felt nor any localized tenderness in the region of the stomach.

Roentgenogram Report. Stomach is orthotonic in type showing moderately active peristalsis and constant niche or filling defect on the lesser curvature and posterior surface. At six hours there is a small residue in the stomach; at twenty-four hours the small intestine is completely evacuated with the head of the meal in the rectum, the tail of the meal in the cecum, the appendix not filled. Plates of the gall-bladder region did not show gallstones.

Diagnosis. The niche on the lesser curvature of the surface of the stomach is characteristic of a crater of a gastric ulcer situated on the lesser curvature and posterior surface. The six hour plate shows a small residue in the stomach; at twenty-four hours the plates show no delay in the passage of the meal through the intestine or colon.

Gastric Analysis. Free hydrochloric acid, 40 per cent; total acid, 60 per cent.

Microscopic Analysis of Urine. Faint trace of albumin and occasional granular casts; few white blood cells and no red blood cells.

Preoperative Diagnosis. Gastric ulcer.

Operation. A v-shaped excision of the ulcer and suture of the opening in layers with iodinized catgut and linen was done; fat tag sutured over line of incision. Two ulcers of the duodenum were felt, one on the anterior surface of the duodenum, 1 cm. from the pyloric vein, and a posterior ulcer in contra position to the anterior ulcer. The one on the anterior surface of the duodenum was punctured through with the actual cautery and the opening was sutured over with linen in two layers and a fat tag was sutured over the line of closure. Nothing was done to the ulcer on the posterior wall of the duodenum. A posterior gastroenterostomy was then done in the usual way; appendix was removed; closure without drainage.

Patient made an uneventful recovery; temperature rising to 104°F. on the first postoperative day, gradually subsiding to normal on the sixth day; wound healed perfectly.

Gastric Analysis. October 31, 1927. At one quarter hour, no free hydrochloric acid; total acid, 16 per cent; bile present. At one hour, free hydrochloric acid, 8 per cent; total acid, 24 per cent; no bile. At two hours, free hydrochloric acid, 30 per cent; total acid, 42 per cent; no bile. No lactic acid.

Roentgenogram Report. October 31st, 1927. The stomach shows a gross deformity and has somewhat the appearance of a partial gastrectomy. There is a freely patent gastroenterostomy stoma with the stomach completely empty at six hours. The plates show no changes in the stomach that simulate a recurrent ulcer or growth.

Follow Up. This patient has been seen at frequent intervals of about three months since his operation. He has steadily gained weight; at the time he left the hospital he weighed 139 pounds and today he probably weighs 175 or 180 pounds. He has had no distress whatsoever

from his stomach, nor has there been any symptom of a marginal ulcer or gastric disturbance of any sort. However, a few weeks after his operation he passed several small stones; he was cystoscoped and was advised that the stones had passed themselves. Patient has gained in weight, eats everything and has had no distress.

COMMENT

These two cases are presented to show what may be termed a good result following conservative surgery. In the man of sixty-three years of age, whose condition was poor, local excision of the gastric ulcer, cautery puncture of the duodenal ulcer and gastroenterostomy have certainly seemed to have produced a cure, although as yet it has been only two and one-half years since his operation. I am quite certain that had I attempted to do a partial gastrectomy there would have been a fatal outcome. His condition did not warrant it.

The second case of gastric ulcer with excision and gastroenterostomy was a man of thirty-five years of age with a hemoglobin of 50 per cent. He was somewhat exsanguinated and a transfusion had to be resorted to. It has been six years and six months since his operation. I have seen this man at intervals of about a year and one-half and each time he has told me that he has had no distress of any kind. His occupation, that of manipulating a large steam shovel, has not been interfered with since his operation. He eats everything, has gained in weight, has no pain and no distress. He has a total hydrochloric acid of 19 per cent and no free hydrochloric acid present. Although he had a gastric ulcer and the procedure of choice would have been a partial gastrectomy, his condition would not have permitted that amount of surgery to have been done. Surgical procedures on the stomach to suit the individual case have to be considered.

At the Roosevelt Hospital from 1915 to 1925 there were 196 cases of chronic duodenal ulcer operated upon with sixteen deaths, a mortality of 8 per cent. Gastroenterostomy was done in 191; pylorectomy in three, pyloric exclusion in one; simple excision in one. Of these 196 cases of chronic duodenal ulcer, 101 were reexamined or heard from by letter in 1922. Of these 101 cases, 77 had gone over the three year period, and of these 77 cases 82 per cent were absolutely symptom free. Of these original 101 cases which were followed up, there were duodenal ulcers in 2.5 per cent. Advocates of partial gastrectomy for chronic duodenal ulcer as a routine procedure are, it seems to me, giving the wrong impression to surgeons generally throughout the country who are not exceedingly skilled in gastric surgery. Horsley has aptly stated in a recent article: "One who performs sub-total gastrectomy skillfully may wisely lean more to this operation than the surgeon who infrequently does a partial gastrectomy and who prefers a gastroenterostomy or a pyloroplasty. Individual technical ability, then, favors the choice in the type of operation. But this dexterity should not tempt one too easily to perform an operation when there is not a reasonable individidation for it." It is true that there are instances of a duodenal ulcer of the anterior wall and an unsuspected ulcer of the posterior wall where gastroenterostomy alone has been done. This is inadequate surgery. However there are many instances of a simple single ulcer of the anterior duodenal wall and a Finney pyloroplasty is an excellent operation for such an ulcer. Also gastroenterostomy will cure many and it is my opinion that the mortality rate in the hands of all but the skilled will be very high if sub-total gastrectomy is insisted upon for single ulcers of the duodenum. Literature abounds in medical and surgical treatments for the cure of ulcers of the stomach and duodenum. There seems to be very little work being done on the causative factors that enter into the formation of ulcers. It is interesting to note how few perforated ulcers which necessitate hurried surgical interference ever recur. This special type of ulcer must be an entirely different kind of a process than the small non-perforating ulcers of the stomach or duodenum. Local excision or cautery puncture with gastroenterostomy still remain procedures which will affect absolute cures in a great number of duodenal ulcer patients.

THE TREATMENT OF STRANGULATED FEMORAL HERNIA*

LAMBERT ROGERS, F.R.C.S. (EDIN.)

CARDIFF, WALES

IN THE AMERICAN JOURNAL OF SURGERY for March, 1928, Dr. Bradley L. Coley records an interesting case of strangulated hernia in a man of forty-eight, in whom under local anesthesia he exteriorised a gangrenous loop of gut and less than twenty-four hours afterwards opened the loop and inserted catheters and subsequently restored the continuity of the gut by anastomosis with a Murphy's button.

This case recalls a somewhat similar one upon whom I operated in September, 1927, and because of the patient's critical condition instituted, like Dr. Coley, a somewhat unusual, but what proved to be highly effective, procedure.

CASE REPORT

Six days before admission to the hospital the patient, a housewife, aged sixty-two, was seized with acute abdominal pain, followed a few hours later by vomiting. A femoral hernia which she had had for ten years became bigger and painful. Her bowels acted before the onset of the abdominal pain, but not afterwards.

When she was admitted, vomiting was feculent, the abdomen was distended and dilated coils of intestine were visible through its thin wall; the tongue was dark brown, the temperature 97.4°F., the pulse 126, small, soft and feeble, and the respirations 26. A small tense, globular, irreducible swelling lay over the lower part of the crural canal.

Treatment. She was at once given 1¼ pints of saline solution intravenously, and continuous subcutaneous saline was commenced and maintained during and for some hours after operation.

Operation. Under novocaine (1 per cent) infiltration anesthesia, the sac was exposed and opened and after dividing its neck and Gimbernat's ligament, a gangrenous loop of small intestine was withdrawn. Eight inches of intestine were resected and an end-to-end anastomosis performed. The intestine was reduced into the abdomen, the sac transfixed and ligated at the neck and the redundant part removed. The wound was hurriedly closed and a high jejunostomy according to Coffey's technique performed through an incision in the upper part of the left semilunar line. Antigas gangrene, 40 c. c., (B. welchii) serum were given intravenously.

Subsequent Course. Convalescence was critical; the hernia wound suppurated but ultimately healed. The catheter in the jejunum came out on the fifth day after its insertion and it was not replaced. The enterostomy closed, healed, and she made a good recovery. Now, six months afterwards, she is fit and well.

COMMENT

The result was very gratifying because on admission the patient appeared moribund. Treatment was carried out for intestinal obstruction, the high jejunostomy being performed to drain the highly toxic contents of the upper small bowel on the assumption that here lie the most toxic bodies. Saline solution was given in large quantity to meet the lowered blood chlorides and fluid depletion, and bicarbonates were withheld owing to the alkalosis.

Attention was called to these blood changes in intestinal obstruction by Haden and Orr[1, 2] in 1923.

Representing the toxic bodies in the upper jejunum as X, and assuming as has been suggested that these bodies are eliminated as hydrochlorides, the bio-

[1] HADEN, R. L. and ORR, T. G. Chemical change in blood after intestinal obstruction. *J. Exper. Med.*, 37: 365, 1923.

[2] HADEN, R. L. and ORR, T. G. Chemical changes in blood of man after acute intestinal obstruction. *Surg., Gynec. & Obst.*, 37: 465, 1923.

* From the Surgical Unit, The Welsh National School of Medicine.

chemical changes in intestinal obstruction may be represented as follows:

$$X \text{ (toxic)} + NaCl + H_2CO_3 = X{\cdot}HCl \text{ (non toxic)} + NaHCO_3$$

Thus the bicarbonate rises (alkalosis) while the blood chlorides fall.

Antigas gangrene serum was given because of its beneficial influence in intestinal obstruction.[3]

[3] Williams, B. T. Importance of toxaemia due to anaerobic organisms in intestinal obstruction and peritonitis. *Brit. J. Surg.*, 14: 295, 1927.

COMPOUND INJURIES OF THE EXTREMITIES*

NINE CASES

John H. Garlock, M.D.

NEW YORK

Case 1. Compound fracture of the tibia and fibula; debridement and suture.

J. B. Seven years of age. Admitted October 30, 1926, discharged Nov. 27, 1926.

While sitting in the door of a dumbwaiter shaft, this patient was injured when the rope broke and the dumbwaiter fell two stories. The force of the impact was received on the right leg. The patient was admitted to the Second Surgical Division of the New York Hospital soon afterwards. Examination showed moderate shock. At the middle of the right tibia was an irregularly shaped longitudinal wound four inches in length, through which the ends of the fractured tibia protruded. There was considerable crushing of the muscles and fascia.

At operation, performed two hours later, the usual preparation was given. An irregular transverse fracture of the tibia with considerable crushing of the extensor muscles of the foot was disclosed. Periosteum of the upper fragment was denuded for a distance of about three inches. The entire wound was debrided including the ends of the bone. The fracture was reduced and the reduction maintained by kangaroo tendon sutures placed obliquely through drill holes. No deep sutures. Interrupted chromic catgut for the skin. Circular plaster cast from toes to mid-thigh was then applied. On November 2, the wound was inspected through a window cut in the cast and found to be clean. Temperature and pulse remained normal and convalescence was uneventful. The wound healed by primary union.

Now, one year later, there is firm union, no shortening, and no limp.

Case 11. Compound fracture of the tibia with secondary skin graft.

H. G. Aged sixteen years. Admitted November 8, 1926, discharged January 6, 1927.

This patient knocked down by a taxicab received an injury to the left leg when one of the wheels passed over it. He was admitted to the New York Hospital soon afterwards and presented the following:

There was a transverse lacerated wound 1½ in. long over the front of the leg at the junction of the middle and lower thirds. The surrounding skin was moderately traumatized. The fractured tibia was visible in the center of the wound.

At operation, performed one and a half hours after admission, the usual preparation was carried out. A longitudinal incision 8 inches in length was made. A large dissecting hematoma was seen along the front of the tibia beneath the periosteum. This extended to within 2 inches below the knee. There was considerable crushing of the posterior tibial muscles. The wound was thoroughly debrided, the hematoma was evacuated, and all traumatized muscle was excised. Fracture was reduced and locked. One kangaroo suture was placed about the tibia at the site of fracture. Interrupted chromic sutures for the skin. No drainage. Releasing incisions were made on each side of the incision because of the apparent trauma to the skin. It was thought that the skin over

* Read before Section of Surgery, New York Academy of Medicine, November 4, 1927.

this region would probably slough. A window was cut in the cast and the wound was inspected daily. The temperature and pulse remained normal. The skin which had been traumatized at the time of accident sloughed leaving an area 7 × 3 inches. This was dakinized, and on December 20, small, deep grafts were applied. The wound was completely healed two weeks later and the patient was discharged from the hospital.

Now, one year later, union is firm, the scar does not break down, there is no shortening or limp.

Case III. Compound fracture of the tibia; debridement and primary suture.

R. B. Eighteen years old. Admitted December 8, 1926, discharged February 12, 1927.

One hour before admission to the New York Hospital this patient was hit by a taxicab, the bumper of which pinned the patient's right leg against an elevator pillar. Physical examination showed considerable shock, which was controlled by an infusion of 500 c.c. of glucose and 20 units of insulin, given according to the Fischer method.

Operation was performed four hours after admission. The usual preparation was given. There were two transverse lacerated wounds over the front of the tibia through which was seen the fractured ends of the tibia. A longitudinal incision was made connecting the two lacerations. There was considerable traumatized muscle and fascia. All traumatized tissue was carefully excised including several small loose fragments of bone. To maintain reduction of the fracture, four drill holes were made and two kangaroo tendon sutures were placed at right angles to each other. The wounds were then closed without drainage, using interrupted chromic for the skin. Circular cast was applied. The wound was inspected daily through a window cut in the cast; it healed by primary union. Temperature and pulse remained normal. On January 17, on removal of the cast, on the lateral aspect of the leg was seen an area 4 × 2½ inches which was covered with slough. This apparently marked the point where considerable trauma had been received at the time of accident. The slough was removed and the wound was dakinized. On January 26, numerous small, deep grafts were applied. Upon discharge from the hospital all wounds were healed.

Now, one year later, union is firm, there is no shortening and no limp.

Case IV. Partial amputation of hand; debridement and primary suture.

W. K. Nineteen years old. Admitted March 12, 1926, discharged March 20, 1926.

A few minutes before admission to the New York Hospital, this patient injured his right hand when it caught in an elevator.

Operation was performed immediately. There was almost complete amputation of the ring and little fingers as far back as the carpometacarpal joints. These avulsed tissues were black. The interrossei and lumbrical muscles, the flexor tendons of the middle finger and the extensor tendons of the index and middle fingers were exposed. There was marked traumatization of the muscle tissue of the hand in this region. The cartilaginous surface of the unciform and the shaft of the middle metacarpal were exposed. The usual preparation was given and complete debridement was performed, amputating the two inner fingers as far back as the carpometacarpal joints. The cartilage on the articular surface of the unciform was excised. The wound was closed with a few interrupted silkworm sutures without drainage. The wound healed by primary union.

Now, eighteen months later, the scar is not tender and the patient has a very useful hand.

Case V. Avulsion of the skin of the hand, early pedunculated skin flap from abdomen in multiple stages.

D. C. Aged twenty-four years. Was admitted March 16, 1925, discharged June 1, 1925.

Patient injured his right hand just before admission, when it became caught in a macaroni rolling machine.

Operation was performed forty-five minutes after admission. It was seen that all the skin and subcutaneous tissues from the wrist to the middle phalanges of all the fingers had been turned inside out as though it were a glove. There was considerable trauma to these tissues. The little finger was completely amputated. Operation consisted of the usual preparation followed by a complete debridement. The flap was turned back and sutured to the skin at the wrist with two silkworm gut sutures. Incisions were made in the Web spaces and the whole hand was extensively drained. Roentgenograms later disclosed fractures of the first, second, and third metacarpal bones and the proximal phalanges of the index and middle fingers. As was expected the skin sloughed. After the wounds had been treated by the Carrel-Dakin technique, it was decided to apply a pedun-

culated skin flap from the abdomen. On April 14, the first stage was done. The hand was placed beneath a skin flap broad enough to cover the wound on the dorsum of the hand. A plaster cast was applied, immobilizing the arm to the side. On April 30, the upper attachment of the flap was divided. Circulation was good. The lower pedicle was extended further, the purpose of this being to roll the hand in such a way so that the flap would unite to the wound on the front of the hand in one continuous piece. The pedicle was further extended two inches and the hand was rolled upwards. On May 6, the third stage was performed when again the lower pedicle was extended for 1½ inches. At the fourth stage, the lower pedicle was divided and the abdominal wound closed by a plastic undermining of the skin. The flap was then rolled around the front of the hand so as to cover the deficiency of the palm. One suture was used. On May 26, the flap was revised and made to conform to the shape of the wound in the palm of the hand. Excess fat was excised at this operation.

While the patient was being treated in the dispensary, it was noticed that there was marked limitation of flexion in the metacarpophalangeal joints of the middle and ring fingers. The flap on the dorsum of the hand appeared too thick. The patient was therefore readmitted September 16, 1925, and an operation was performed. This consisted of excision of the scar in the region of the metacarpophalangeal joints, freeing of the extensor tendons, and posterior capsulotomy of the metacarpophalangeal joints of the ring and middle fingers. The excess fat in the graft along the inner side of the hand was excised. The fingers were put up in acute flexion. The patient was discharged September 21, with the wound healed, showing a marked improvement in flexion of the ring and middle fingers. To reduce the thickness of the flap on the outer side of the hand, another operation was performed on January 21, 1926. On this date, excess fat and skin were excised.

At the present time, two and one-half years following the accident, there is practically normal motion in all the fingers, the hand, cosmetically, is quite presentable, and the skin has acquired sensation. The patient has returned to his former occupation.

Case vi. Gunshot wound of hand.

J. D. Seven years of age. Admitted January 8, 1927, discharged January 18, 1927.

Just before admission this patient was playing with a toy gun. He placed a 45 caliber rifle cartridge in the gun and tried to fire it. As the cartridge was too long to fit in the barrel of the gun, the patient held it in his left hand and pulled the trigger. The cartridge exploded into the palm of the left hand.

Examination showed that the thumb was almost completely avulsed at the carpometacarpal joint. There was an irregularly shaped laceration along the adduction crease extending around to the dorsum of the hand. The thenar muscles were pulpified. The flexor sheath of the thumb was open but the tendon appeared intact. The first dorsal interosseous muscle was divided and crushed. The carpometacarpal joint was exposed and its capsule was practically completely divided. No nerves were visible. There were numerous lacerations on the thumb, one of them exposing the distal joint. The index finger was partially amputated through the middle of the distal phalanx. A flap of skin had been avulsed from the proximal phalanx of the index finger but remained attached by a broad base anteriorly. The middle finger was partially amputated through the middle of the distal phalanx.

Operation consisted of the usual preparation followed by a complete debridement. Remains of the various muscles were sutured by fine catgut. All joint capsules were closed. The skin flap on the index finger was sutured back in place. The amputated ends of the index and middle fingers were debrided and left wide open. The wound in the palm was closed without drainage. There was no elevation of temperature or pulse and all wounds were healed within three weeks without evidence of infection. Baking and massage were given.

Now, ten months later, all wounds are healed and there is normal motion in the fingers. Because of the loss of the thenar muscles, there is some impairment of adduction of the thumb.

Case vii. Avulsion of the skin over the back of the elbow; debridement and secondary skin graft.

F. B. Aged fifty. Admitted March 22, 1926, discharged April 23, 1926.

An hour before admission, the patient caught his right arm in the gears of a washing machine. The skin over the posterior aspect over the elbow, forearm and arm was avulsed.

At operation it was seen that the skin and subcutaneous tissues over an area measuring 9 × 3½ inches had been avulsed. The tip of

the olecranon process of the ulna was fractured and the elbow joint was visible. There was no nerve injury. A large amount of dirt and grease had been ground into the wound. Operation consisted of the usual preparation followed by thorough debridement. The arm was put up in extension in a Thomas splint and dakinized. On April 14, 1926, the area was covered with half thickness skin grafts taken from the front of the thigh. The elbow was put up in acute flexion. Convalescence was uneventful.

Now, one and one-half years later, the wound is completely healed and there is normal motion in the elbow joint. The patient has returned to his former occupation.

Case VIII. Compound fracture of the ulna; debridement and suture.

R. J. Aged twenty-four. Admitted November 24, 1926, discharged December 2, 1926.

Thirty minutes before admission to the hospital this patient received an injury to the left forearm when it was caught in the revolving wheel of a weaving machine. Physical examination showed a 5 in. transverse laceration at about the middle of the left forearm along the inner aspect. Through this wound protruded the ends of the fractured ulna. After the usual preparation, operation was performed, and it was found that there was a comminuted fracture through the middle of the shaft of the ulna with considerable crushing of the muscles. There was another fracture through the shaft of the radius, one inch distal to the ulnar fracture. The entire wound was debrided and the fracture of the ulna reduced. It was thought that satisfactory reduction of the radius was obtained at the same time. To maintain reduction, two strands of kangaroo tendon were placed about the fractured site. The wound was closed without drainage and a circular plaster cast applied with the elbow at right angles and the forearm in mid-pronation. Convalescence was uneventful, but it was soon noted that the fractured radius was healed with considerable angulation of the fragments. Open operation was advised and this was performed January 8, 1927. Mal-position of the fragments was found, with excessive callus. The callus was excised, the fracture was reduced and maintained by kangaroo tendon placed through obliquely made drill holes. Plaster cast was applied. This was worn for ten weeks, following which a course of physiotherapy was administered.

At the present time, one year after the first operation, there is firm union, motion in the elbow and wrist joints is normal, supination is impaired about 25 per cent, pronation is normal.

Case IX. Division of structures at front of wrist; debridement and primary suture.

A. G. Aged sixteen years. Admitted July 26, 1927, discharged August 1, 1927.

This boy received an injury to the left wrist when the sharp edge of the fender of an automobile which had thrown him down cut the region of the wrist. Physical examination showed a transverse laceration over the front of the wrist with evidence pointing toward division of the flexor tendons of the thumb, index, and middle fingers, as well as the median nerve. At operation the following structures were found divided:

1. Flexor longus pollicis.
2. Flexor sublimus and profundus tendons of the index and middle fingers.
3. Median nerve.

The tendons were repaired by the technique described in a previous communication.* The nerve was repaired by using six sutures of fine silk placed in the perineural tissues. The wrist was put up in acute flexion, and maintained in this position for eighteen days. Since then, the patient has been receiving massage and faradic stimulation of the muscles of the hand.

At the present time, there is normal function in the fingers and evidence of beginning regeneration of the median nerve.

DISCUSSION

Dr. John J. Moorhead. There are several reasons for Dr. Garlock's success and among the most important of these may be mentioned specialization of this type of service and early operation.

There seems to be a six to twelve hour period of incubation in all sorts of trauma similar to that in, for example, abdominal surgery. If we operate within twelve hours following a ruptured gastric ulcer or ruptured appendix, the chances are good. It is the same with other

*Garlock, J. H. Repair of wounds of flexor tendons of hand. *Ann. Surg.*, 83: 3, 1926. Repair processes in wounds of tendons, and in tendon grafts. *Ibid.*, 55: 92, 1926.

trauma, especially in fractures. If we can reduce these within a few hours we are treating the fracture without complications. If we wait, we are treating the fracture plus complications, and if this is so in respect to simple fractures, how much more is it so with compound fractures.

I am in opposition to Dr. Garlock in regard to suturing compound fractures, believing this to be a very dangerous procedure except in carefully selected cases seen within six to twelve hours. During the war primary suture was practically abandoned and instead primo-secondary or delayed suture substituted. This means that we cleaned the wound and placed but did not tie the sutures until the third day when clinically and bacteriologically conditions were satisfactory. This is the safest method for treating all kinds of accidental wounds with or without fracture.

Dr. Walter M. Brickner. There are only two points I want to refer to. Dr. Moorhead has spoken of one, and both were emphasized by Dr. Garlock in his presentation of the application to civil surgery of the lessons learned in the war. One is the importance of treating all compound injuries immediately, or as soon as possible, because it is only then that we can hope to remove threatened tissue before "contamination" reaches the stage of actual "infection." In other words, it is only in the first few hours that we can successfully apply "wound excision," epluchage, or what is by American and British surgeons commonly but erroneously call débridement. ("Débridement" means removal of pressure by free incision; it does not mean the removal of débris.)

The other point is never to lose sight of the possibility of infection with anaeorobes, especially gas gangrene organisms. We have been apt to think that is something we do not encounter very often in civil practice, but it does occur every once in a while with street injuries and even in other conditions as, for example, in the gangrene of diabetes. It has been my experience to deal with five cases of gas gangrene infection since 1919 and, although I thought I had learned something about it during the war I lost every one of those cases. In France Professor Vincent at Val-de-Grace and Weinberg and Seguin at the Pasteur Institute evolved polyvalent gas gangrene antitoxins that have given excellent results. The only antitoxin that has been available in this country, I believe, is one said to be made according to the method of Bull and Pritchett, "perfringens" or Welch bacillus antitoxin combined with tetanus antitoxin. I treated four of the above cases with it and I am convinced that the reactions it produced were largely responsible for their deaths, so I cannot recommend its use.

You will remember that Bull and Pritchett, working at the Rockefeller Institute in 1917, evolved a Welch bacillus antitoxin that worked perfectly on experimental animals; but when taken to the battlefields of France it proved a lamentable failure, probably because, as the French had been discovering, the Welch bacillus is only one, and not always the most important one, of several symbiotic organisms responsible for the gas gangrene so prevalent in war wounds. The polyvalent serums of the French are the only ones that will work, I believe. Towards the end of the war I had an opportunity to see Chutro in Paris treat with Weinberg and Seguin's serum cases apparently inoperable; and it was remarkable to see them almost dying one day and fairly convalescent the next. With each of my post bellum cases I tried in vain to get a polyvalent antitoxin but I found it was not to be had through any commercial laboratory, the Rockefeller Institute, the Department of Health of New York City, or the laboratories of the Army or the Public Health Service. It will be a pity if in this large country where the total of gas gangrene infection is large we have not available serum adequate for its treatment. I have referred to this before[1] and I do so again now in the hope of stimulating the manufacture of such an antitoxin in the United States [and I am glad to note now that the Council on Pharmacy and Chemistry of the American Medical Association has approved a product of the Lederle Laboratories consisting of mixed sera against B. tetani, B. welchii (perfringens), and vibrion septique].

Dr. Robert H. Kennedy. In the past four years I have had occasion to see a number of cases of gas gangrene at the Beekman Street Hospital. We have been using Lederle's tetanus perfringens antitoxin and have thought that we got good results. The administration of this serum has been accompanied by adequate surgical drainage. These patients have recovered from the gas infection, whether because of, or in spite of the serum, I do not know. Clinically these were gas cases and

[1] Editorial. Am. J. Surg., 1926, i, 228.

showed the morphology and characteristics of growth, but were not proved by animal inoculation.

Dr. Morris Josephs. We have had two cases at the Passaic hospitals in which we administered the Mulford serum and both recovered. In one of the cases we recovered the Bacillus welchii from a rabbit after inoculation. The Parke Davis Company is working on a serum in combination with tetanus antitoxin to be given as a prophylactic in all bad injury cases. It is interesting that we are now awakening in civil surgery to the fact that gas infection is more common than we supposed and I am happy to report that a remedy is being produced.

Dr. Garlock. Dr. Moorhead and I are in perfect agreement regarding the closure of compound wounds after the lapse of six or seven or more hours. In the few cases that we have had of this type, we have never sutured the wounds at operation, contenting ourselves solely with a wound excision followed by dakinization. At a subsequent date, secondary suture was performed. As the great majority of the cases reported in this communication were seen in the initial one or two hours, most of them were closed at operation without drainage.

Dr. Brickner's remarks relative to polyvalent serum for gas gangrene are most important. Our experience, limited to three cases, has been exactly similar to his. In one, the serum seemed to hasten the patient's death. In the other two it had no effect whatsoever. As far as our knowledge goes, no potent serum has been developed in the United States.

A SURGICAL PROCEDURE FOR TREATMENT OF PERSISTENT CHRONIC PYELONEPHRITIS AND COMPLETE ORGANIC URETHRAL OBSTRUCTION

Caryl Potter, M.D., F.A.C.S.

ST. JOSEPH, MISSOURI

Case 1. Female, aged fifty-five. Complained of chills, fever, constipation, pain in the right lower quadrant and over both lumbar regions, frequent but scant urination, anorexia, nausea and weakness.

Family history: Father died in youth during army service; mother at eighty-four years from senility and uremia. One sister has had epilepsy since childhood.

Personal history: Industrious since girlhood. For several years a forewoman in a large manufacturing plant. Constipated since youth. Fifteen years previous had a supravaginal hysterectomy with bilateral salpingo-oophorectomy for fibromyoma of the uterus and cystic ovaries (one containing a fairly large cyst). The appendix was also removed. For about ten years she had what was designated "bladder trouble." During this time pus 4 had been found in every catheterized bladder specimen. She has had many periods during which she complained of marked frequency. The pus has been constant but the frequency intermittent. Complete urological examination has often been advised, but she refused to quit work long enough to accomplish this. On account of persistent insistence that such an examination be made, she sought other medical advice and has been treated off and on elsewhere for malaria, chills and fever, influenza and bladder trouble and for acute exacerbations of urinary tract infection which were probably the cause of all the symptoms accounting for these various diagnoses.

Present illness: Started about eight weeks previous to admission to the hospital. At that time a competent internist saw her and found an almost complete suppression of urine, fever and pyuria. He advised her to go to the hospital for a complete examination but his insistence was rewarded by a change of physicians. She was next treated palliatively by a general practitioner for several weeks. He finally told her that she had hysteria and chronic malaria and, after a quinine course without results, told her he could do nothing more for her. The writer was called the day before admission to the hospital, November 3, 1925, at which time she

was in bed complaining of general malaise, chills and fever, abdominal pain, indigestion, and acute pain over both kidneys. She was sent to the hospital in an ambulance.

Examination: Pale, anemic-looking woman, with sallow, waxy-looking skin and pale mucous membranes. Slight edema of the ankles. Teeth absent, head otherwise negative. Chest negative. Abdomen showed scar of previous operation, some tenderness and distension. Gynecological examination: female organs absent except stump of cervix which was small and showed no discharge. Marked tenderness on fist percussion over the pelves of both kidneys. Catheterized specimen showed albumin 4. Pus cells 4. No casts. Blood examination: hemoglobin, 70 per cent; red blood cells, 2,950,000; leucocytes, 18,200; polymorphoneuclears, 85 per cent; lymphocytes, 15 per cent. Red cells even in size and shape, and an occasional nucleated red cell found. N.P.N. 42.8 mg. per 100 c.c. of blood. Blood sugar 14 mg. per 100 c.c. of blood.

Cystoscopic examination: Anterior, posterior and lateral walls of the bladder showed marked congestion. Internal sphincter, hyperemic; trigone, very hyperemic. Ureteral orifices, right and left surrounded by hyperemic areas. Both ureters patulous. Flow from both practically normal. Functional test (indigo carmine) gave for both kidneys very light blue in five minutes and not any darker in fifteen minutes. Laboratory examination of kidney specimens: right, many epithelial cells, pus cells 4, red blood cells 1, colon bacilli 4, and staphylococci 4; left, practically the same. No acid fast bacilli found. During her first hospital period the patient was given bladder irrigations of silver nitrate and later daily instillations of 10 per cent argyrol into the bladder. From November 3 to December 2, 1925, she had four silver nitrate irrigations of the pelves of the kidneys. Pyelograms were not taken because of the fear of exciting a more severe pyelitis or nephritis.

On account of the anemia she was given a transfusion of 1000 c.c. of blood. Although the symptomatic improvement was marked, the urine from neither kidney showed apparent decrease in pus cells. At the last ureteral catheterization each pelvis was drained through a ureteral retention catheter for thirty-six hours. Roentgen-ray examination of the alimentary canal was negative, except that it was observed that the unevenness of distribution of barium in the colon was very characteristic of a chronic spastic constipation, which was in line with her history. On discharge from the hospital, she was given a urinary antiseptic and a diet list, and was instructed to report in ten days for irrigation of the kidney pelves.

In response to an emergency call to her home December 11, 1925, it was found that she had had a chill lasting thirty minutes, was vomiting and had pain and exquisite tenderness over the right kidney. Temperature, 104°; Pulse, 96. On readmission to the hospital a catheterized bladder specimen showed pus 4. After consultation it was decided to explore the right kidney. The same operative procedure described later was done on each kidney with a ten day interval between the first and second operation. She was discharged from the hospital January 24, 1926.

A catheterized specimen taken January 23, 1926, showed specific gravity, 1012, and about five pus cells to each microscopic field with no casts, no colon bacilli present. Another specimen examined January 29, 1926, showed from three to four leucocytes to each microscopic field, a scarcely discernible trace of albumin, one-fourth gram of albumin per liter and practically no bacteria. She felt very much improved, and was eating and sleeping well. Her constipation was being controlled by mineral oil and agar. Specimen examined February 15, 1926, was practically negative except for a faint trace of albumin and an occasional pus cell. Urinalyses on March 10 and April 8, 1926, were negative except for a faint trace of albumin. On May 5, 1926, patient reported to me that she had returned to work, and was feeling well. Urine negative. Subsequent urine examination on the following dates were all negative: September 1, 1926; January 1, July 15, August 15, and December 2, 1927.

The treatment of chronic pyelitis, especially the colon bacillus type, has baffled general practitioners, surgeons and urologists. When it has reached the chronic state, there is a persistent type that has resisted all forms of treatment. Even when recognized early, it has often passed on to chronicity, regardless of early recognition and treatment. Most often, however, the condition has become chronic through failure of recognition in the early stages, when symptomatic treatment for so-called stomach trouble, malaria, chills

and fever and bladder trouble had been used. The patient has often been guilty of self-neglect and indifference for years

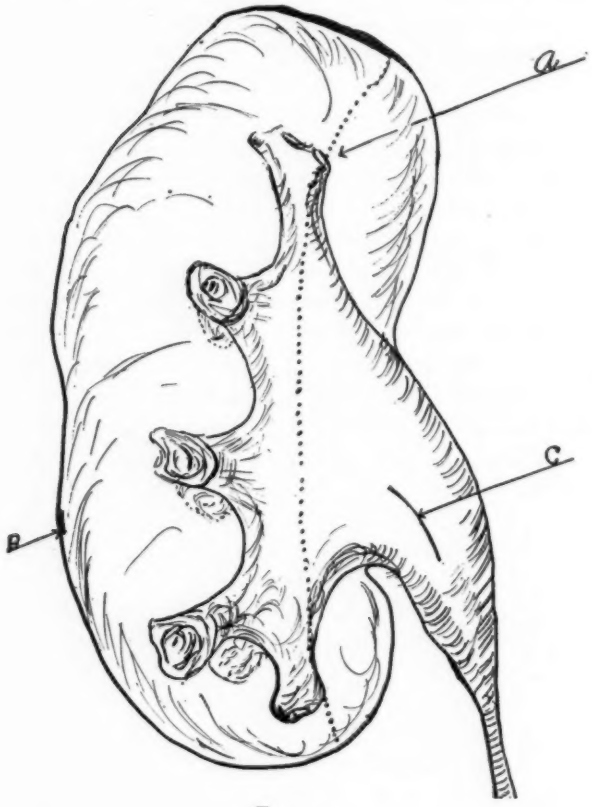

Fig. 1.

because the presence of pus in the voided or catheterized specimen, colon bacilli, anemia and gastrointestinal symptoms have been minimized, due to the absence of severe or incapitating symptoms. However, when once the condition has become fixed, there is no pathological process that is more tenacious and becomes so resistent to treatment as the colon bacillus type. It may have involved only the pelvis for several years but sooner or later the infection extends to the kidney, and a more or less extensive pyelonephritis with definite changes in the mucous membrane of the pelvis, tubules and cortex, supervenes. It is doubtful if pyelitis can exist over any long period of time without the kidney substance becoming involved. With the resulting nephritis, acute exacerbations are inevitable as long as pyelitis is present. The acute and subacute forms should not be confused with chronic bilateral pyelonephritis, since they are self-limiting and often unilateral.

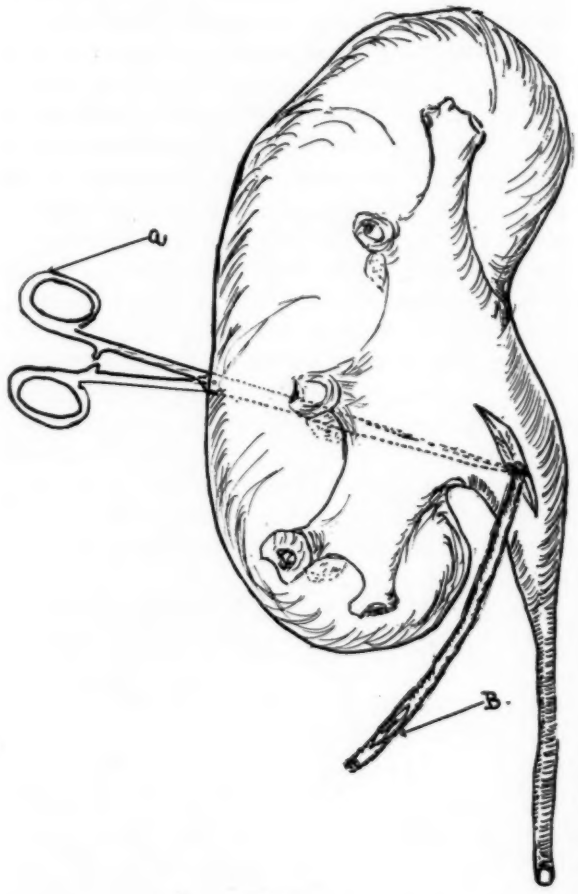

Fig. 2.

In the chronic form, therefore, we have to deal with chronic pyelitis and chronic nephritis, either of the two showing acute or subacute recurrence at the same or different times. In treating the pyelitis, the nephritis, which is secondary, must always be considered.

In reviewing the first case herein reported, it will be seen that it had all the advantages of proper, thorough, urological and systemic treatment: i.e. removal of foci of infection, irrigations of the kidney pelves, ureteral catheter drainage, prolonged rest in bed, urinary antiseptics, colon bacillus mixed vaccine, intravenous medication and even the injection of blood by transfusion to overcome the anemia and build up the resistance. The patient was

discharged from the hospital and as the urine was still heavily loaded with pus and colon bacilli and a normal temperature

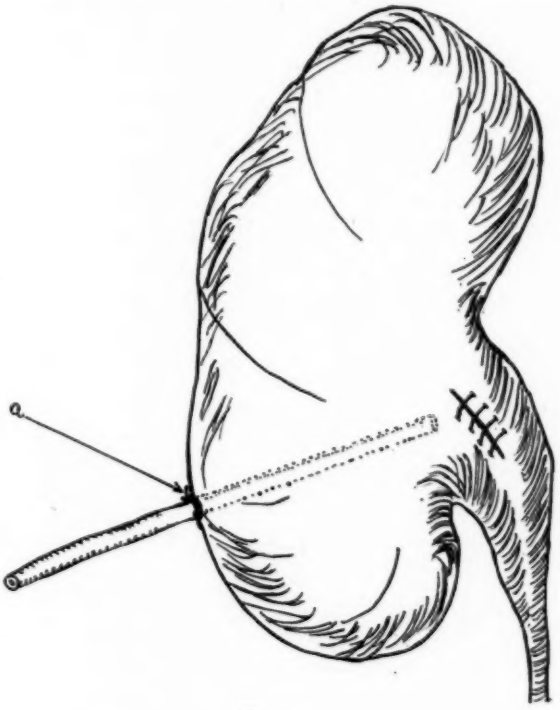

Fig. 3.

and leucocyte count were recorded, there was a feeling that urological treatment could be continued at the office. Shortly after discharge, however, she was smitten with an attack of acute pain over the right kidney, a chill lasting thirty minutes, nausea and vomiting, and temperature of 104°F.

Edebohl advocates the decapsulation of the kidney in both acute and chronic nephritis believing that this relieves tension from the rigid envelopment of a solid organ in a fixed fibrous capsule and establishes a new anastomotic blood supply by way of the kidney surface. He says he is willing to operate on any case of chronic Bright's disease where expectancy is not less than a month. He happened to stumble onto his procedure by noticing that in cases of nephroptosis accompanied by nephritis caused by interference with drainage, the symptoms of nephroptosis were not only relieved but the nephritis cleared up after suspension and decapsulation. In 72 cases, including all types of nephritis, 20 died from other causes, 3 were unimproved, 20 improved, 17 were

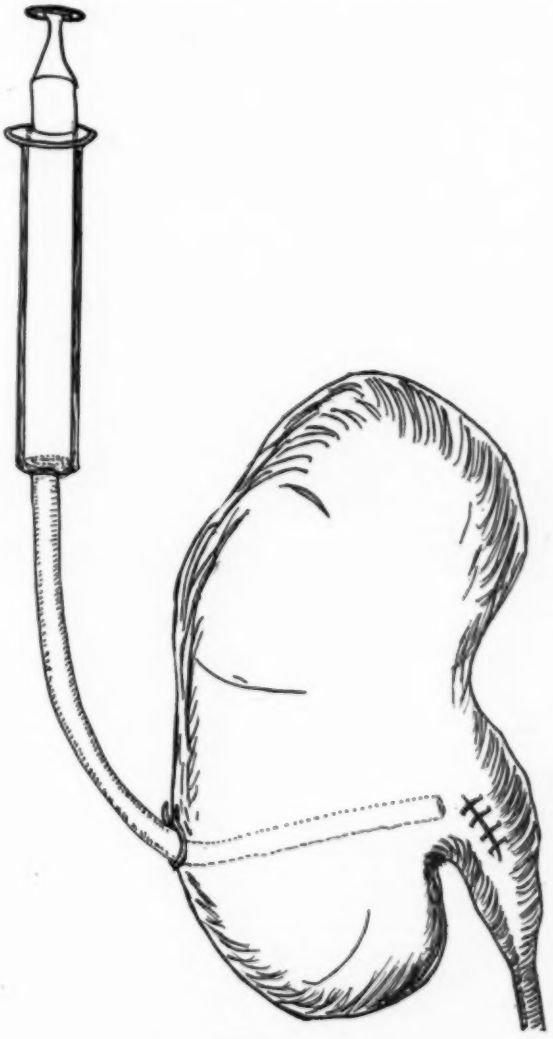

Fig. 4.

cured, and in 3 the results were unknown. The greatest number of cures were cases which fell under the classification of chronic interstitial nephritis.

No mention of a single procedure for the treatment of the nephritis and pyelitis can be found. The reports all describe the resistance to treatment of the chronic cases of pyelitis and the urologic treatment followed on these condemned patients, but there is no reference to a rational, radical cure for the condition. The urologist had come to the end of his rope in this case; the condition showed such an alarming exacer-

bation that it was thought advisable to explore the right kidney.

A pyelogram had been purposely omitted

Fig. 5.

in previous urological examinations because of the fear of stirring up acute symptoms.

At operation the following pathology was found: large, white kidneys, twice the normal size, firmly bound down by adhesions. The pelves were not particularly distended but the walls were very much thickened. The ureters were patent.

After dividing the adhesions and delivering the kidney, a decapsulation of each kidney was done (Fig. 1). The pelvis was wiped free from fat and thoroughly exposed. A small incision was made in the pelvis between two Poirier-St. John forceps. A straight Kelly forceps was bored through the kidney substance at Brodel's line, the location of the silent vascular area, until the points protruded into the pelvis (Fig. 2). A rubber tube the size of a waxed paper straw was pulled through the kidney substance in the tract made by the spread of the Kelly forceps. The fenestrated end of the tube was left free in the pelvis. The tube was held in place by two sutures, introduced through the kidney cortex. The opening in the pelvis was closed by a continuous No. 00, twenty-day catgut suture (Fig. 3). A rubber tissue drain was carried down to the pelvic suture line. The wound was closed layer by layer and the tube reanchored by a silkworm-gut suture to the skin. Urine drained freely through the tube and daily instillations of 10 per cent argyrol were introduced through the tube into the kidney pelvis (Fig. 4). The bladder urine showed a large amount of argyrol present for twenty-four hours after each injection. The same procedure was followed in the left kidney twelve days after the first operation. Sodium iodide solution was injected through the tube into the pelvis of each kidney, and a roentgenogram taken. Each tube was left in for eighteen days.

Figure 5 shows the tube in the pelvis of the kidney working perfectly. Examinations of the urine, following the removal of both tubes, have shown marked, continuous improvement. The urinalyses are recorded above in the history.

Dr. Charles Greenberg had performed the cystocopic examination in the preceding case, and had followed it through the operation. He, therefore, decided to use the above described procedure in the following case:

Case II. Male, aged forty-two, complained of pain in right lumbar region and complete anuria.

Past history: Was treated for cystitis for a number of years prior to operation eight years ago when a diagnosis of tuberculosis of the left kidney was made. Kidney was removed. Both testicles had been previously removed for bilateral tubercular epididymitis.

Patient did not have any symptoms up to about September, 1925, when he began to have acute attacks of pain in the right lumbar region, followed by complete anuria.

Cystoscopic examination: Revealed a very much contracted bladder wall. Mucosa lined with thick mucous flakes which could not be dislodged. Both ureteral orifices of the golf-hole type. Catheter passed half way up the right ureter. Able to pass this stricture on several occasions. Due to the ensuing ureteritis, many subsequent attempts futile. Although the cathether would not pass the stricture, the kidney would drain through the catheter. At the last attempt, after an anuria lasting about

twelve hours, it was found impossible to recover urine, and the following operation was done.

Kidney was exposed through usual lumbar incision and at Brodel's line forceps inserted through the substance of the kidney into the pelvis. After spreading the forceps, a rubber tube was inserted through this into the pelvis. Kidney was anchored to the muscle wall and the incision closed layer by layer around the tube.

The laboratory reports had shown that there were numerous tubercle bacilli in the urine. The kidney was very much enlarged, but no gross tuberculosis could be demonstrated in the incomplete examination at the operation.

Improvement began within twelve hours after operation. Profuse urinary drainage occurred through and around the tube. About six days after operation patient voided four ounces of urine and this continued for several days but thereafter the drainage was entirely lumbar, no urine coming through the bladder.

Urine continued to drain freely from the kidney pelvis through the tube. The patient's condition improved rapidly and a large amount of urine drained daily through a hose which connected the pelvic drainage tube with a receptacle. The only deviation from the technique of the operation in the first case was that the kidney pelvis was not incised. The kidney was so large and pelvis so distended that the blunt forceps easily bored a channel into the pelvis for the introduction of the tube.

About one month later he resumed his work as draftsman and continued this work till the late summer of 1927 when he developed extensive intestinal tuberculosis and died. He had, however, been able to be self-supporting almost two years and the urinary fistula in the back was working satisfactorily at the time of the onset of his terminal intestinal tuberculosis with fatal obstruction. At the time of his death he was still carrying the tube in his back and for all the preceding months the urine had drained into an improvised urinal which was strapped to the lumbar region. It was the intention to have a silver tube constructed so that it could be introduced into the fistulous tract and strapped to his back.

The procedure herein advocated has therefore not only proved useful in the treatment of chronic pyelitis of the colon bacillus type but also in an unusual condition of which Case II is a type. No other procedure could have been adopted to relieve such a patient in extremis. It is generally known that tubercular processes are benefitted if placed completely at rest, and when this operation was adopted for this case it was hoped that there would be the additional benefit of complete rest to the bladder and ureter with benefit to the tuberculosis. There was no opportunity to make any subsequent observations that would give us any information to substantiate this.

CONCLUSIONS

1. Chronic pyelitis can be successfully treated by direct, surgical, pelvic, tubal drainage and direct instillation of an antiseptic solution through a tube introduced into the kidney pelvis through a tract bored through the least vascular area of the kidney.

2. Chronic pyelonephritis can be successfully treated by the same procedure, plus decapsulation after the manner of Edebohl.

3. In rare cases, such as Case II, the patient's life can be prolonged and he can be at least temporarily restored to useful work by direct surgical drainage of one kidney pelvis, even in the absence of the opposite kidney, a stricture of the ureter on the side of the functioning kidney, and an involvement of the bladder—in fact, when it seems that the entire urinary tract is incapacitated except for a part of one kidney.

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EDITORIALS

RESURRECTION OF THE MURPHY BUTTON

J. W. KENNEDY, M.D., F.A.C.S.

PHILADELPHIA

RECENTLY, that prince of teachers, John Chalmers Da Costa, reported* the discovery of an old operating table, a genuine antique of American surgery. This operating table was the first used in Jefferson College in 1877. Professor Da Costa came across the table in the basement of the hospital where it had been abandoned as a catchall for oil cans and various sorts of waste.

In his opening remarks of dedication in resurrecting this old friendly table, he says

> An old wooden table! It is not artistic or dainty but rather solid and capable. It was made for grim practical uses and not for show. It is not like a Chippendale chair, a Sheraton sideboard or a Hepplewhite table adorning a white colonial drawing room or a parlor containing a hodge-podge of furniture of various makes and ages. It is not meant to be a part of any society affair which would draw a crowd of the most uninteresting people in the world, herded by social ambition, fear or mental vacuity to that last possibility of imbecility, an afternoon tea.

I not only feelingly endorse Professor Da Costa's remarks concerning the old table but I further feel the same way toward the Murphy button.

The Murphy button is certainly not a device of fashion, it has not the commendation of popularity, it is little understood and has been so modified in recent construction as to render unsafe some of its most sturdy principles.

From the time the Murphy button was given the profession it has been used almost exclusively in our anastomotic work in the Joseph Price Hospital.

I recall a conversation between Doctors Murphy and Price during which Dr. Murphy told Dr. Price that he had done

* Facts concerning the old operating table. *Jefferson Medical College Alumni Bulletin*, May, 1928.

more to bring out the sterling functions of the button than had its namesake.

It needs no discussion to place it upon the list as the most rapid of all means of making an anastomosis. With a little good management it is more easily accomplished than any other method of bowel union. It is by far the freest method from hemorrhage of all efforts at intestinal anastomosis. Its freedom from hemorrhage is due, of course, to the clamp principle of controlling bleeding, as no vessel escapes pressure from the clamping shoulders of the button. A larger extent of bowel can always be removed by the use of the button than by any other method; this is important in its use for malignancy.

There is always less danger from leak at the anastomotic ring than from any other method; we have never seen such follow its use in the Joseph Price Hospital. There is much less danger of failure of union in questionable bowel than in any other method. There is never any danger of stitch syphoning infection which may be of serious import as is seen sometimes in the stitch method.

The button is entirely void of damaging trauma to the bowel wall, such as is too often seen in today's clamp method of anastomosis, either as end-to-end or lateral union.

The opening from the button is much less apt to contract than that made by incision. The opening produced by the Murphy button is accomplished by a slough which is always less apt to contract or close than an incised wound. This principle is seen in all fistulous openings.

When the button is used as a lateral anastomosis there is no need for any reenforcing sutures and there is thus no cause for any wide area of fibrous tissue which is incident to unnecessary suturing that might later cause contraction of the anastomotic ring. This is important and is one of the great virtues of the Murphy button.

The clamp and suture method which is so popular is predisposed to contraction on account of the excessive trauma of the technique and the great amount of stitching which must be done, all predisposing causes to infection, contraction, etc. The possibilities of infection in the use of the button are reduced to a minimum as there is no exposure of the mucous membrane of the bowel in its use.

The objections to use of the Murphy button on account of its being a mechanical means and a foreign body with the possibilities of producing a postoperative bowel obstruction is ill founded and academic, as during the entire life of the button it has been used in the Joseph Price Hospital without a single cause for any such contention.

Its use is to be strongly recommended in doing a gastroenterostomy following resection of a large portion of the stomach for malignancy, as the anastomosis can be made with rapidity and made more easily in the remaining small portion of the stomach. In a monograph entitled Practical Surgery of the Joseph Price Hospital, this function of the button has been discussed and illustrated and its importance in acute bowel obstruction emphasized.

In peritonitic lesions where a considerable length of bowel has to be removed on account of multiple injuries which have occurred from breaking adhesions and where there is necrosed bowel, the button should be used. However, in multiple lesions of the intestine from such surgery, an earnest effort should be made to repair the same, as these patients should be saved a resection if possible. We have many times reduced the lumen of the bowel over one-half in repair and have never experienced obstructive symptoms.

By all odds the button's most important function is one which is rarely, if at all, discussed and that is its distending and drainage function. This makes it the means par excellence of anastomosis where any length of bowel is to be resected for acute obstruction, and it is my opinion it is the only method which should be considered in these grave cases.

Most surgeons today in operating on

these patients do an enterostomy or colostomy proximal to the site of anastomosis in order to drain the distended bowel. Such is entirely unnecessary if the button is used. The distending function of the button holds the anastomotic ring open from the moment of the operation, which permits gas and infected fluids to pass rapidly on and the operator is often rewarded by a copious bowel movement within a few hours following the operation. This is, of course, to be welcomed and means victory in nearly all cases.

I recently resected over 7 feet of gangrenous bowel in a man nearly seventy. A large bowel movement followed within five hours, uneventful recovery taking place.

I have had thirteen recoveries in succession where not less than 2½ to 7 feet of intestine had been resected for acute obstruction.

Moynihan says in his latest work on abdominal surgery: "For every case reported as a cure from acute bowel obstruction five die and the mortality in any series of twenty or more cases will be 50 per cent." I could not have obtained any such results in the above thirteen cases had I used any other means than the bottom. Mr. Moynihan in the second volume of the eighth edition of Abdominal Surgery gives an account of a large number of recoveries which were conspicuous on account of the great extent of bowel which was resected. I find consolation in this report for the reason that although the button is little used as a popular method of anastomosis, yet in this series of recoveries which were reported on account of the great length of bowel removed, the button had a large per cent of recoveries.

It is this distending function of the button which permits immediate drainage of the mucous membrane which gives the Murphy button its victories and which will eventually bring the button into popular use by the profession.

Some years ago I operated on two patients, doing a resection followed by end-to-end anastomosis, stitch method. These patients continued their distention, and on the third day I reopened; the anastomosis was in perfect condition. No evidence of local infection appeared but in each case immediately above the anastomotic ring the bowel was distended, for gas had not passed through the opening. I irrigated the bowel with hot saline solution and made gentle manipulation and the gas passed on. Both cases recovered but I am sure I would have lost both had I not reopened. This taught me a very valuable lesson; such would not have occurred with the button and I now use nothing else.

In all methods of intestinal anastomosis there exists at least a temporary period of paralysis of the bowel at the site of union and peristaltic movement does not readily pass the location of the anastomosis and thus the bowel is not immediately drained. Yet drainage is essential and determines the outcome of the operation in all acute obstructions.

In the Murphy button operation this temporary paresis of the bowel may, of course, occur but the mechanical distention of the bowel at the anastomotic ring permits the gas to pass on without assistance of the peristaltic wave and therefore the bowel is immediately drained and distention relieved.

Another redeeming feature of the button is that there is no temporary distention of the bowel at the site of the anastomosis. Therefore, there is no tendency toward a leak or rupture of the sutured end of the bowel, since no force by distention upon the anastomotic ring has occurred as does in all suture operations.

The button is ideal in resection of the cecum and ascending colon and last few inches of the ileum, in resection of the pelvic colon where anastomosis is required with the rectum, and in any location of the large or small bowel where manipulation is difficult.

The operator naturally works out his own technique. If the two halves of the button can be placed within the intestine

or stomach and then pushed along to location where the anastomosis is to be made, this is desirable, but such cannot always be done. I usually place on four clamps, cut between with cautery, remove section to be discarded, then open one of the clamps which has within it the end of the good bowel, drop in one-half of the button, replace the clamp, then overwhip clamp with the suture which is to close the end of the bowel. There will be no escape of infected bowel contents if, before one opens the clamp in order to drop in one-half of the button, another clamp is placed on the bowel 2 inches from its resected end, the gas being first pressed back of the forceps which are placed to prevent escape of gas as the button is being inserted.

The construction of the button today is so faulty that we seldom use it in an end-to-end anastomosis. The diameter of the cylinder has been increased to such an extent that the shoulders of the button have too little clamping space and therefore if it is used as an end-to-end anastomosis the mucous membrane of the incised bowel everts between the clamping shoulders of the two halves of the button and a leak is apt to take place. When it is used in a lateral anastomosis this does not take place, as a puncture may be made over the cylinder of the button and the bowel wall which tightly hugs the cylinder is pushed over the same, preventing any eversion.

When the button is used as a means of a lateral anastomosis it is passed several days earlier than when used as end-to-end anastomosis. The serous surfaces are held in such perfect apposition with uniform pressure from the shoulders of the button that the slough takes place earlier than would occur in an end-to-end union where very often some tags of mucous membrane may prevent perfect apposition and thus hold the button in stationary position for some time.

I operated on a man of ninety years, doing a Murphy button anastomosis between cecum and sigmoid for extensive malignancy of the transverse colon. This patient passed the button on the third day and lived over two years, dying from pneumonia.

As I enter my second quarter of a century experience in abdominal surgery, I find that all intra-abdominal procedures which are primarily the most finished and are not anticipating a second operation as an auxillary, have by far the best results.

The Murphy button will again come into its own when the profession learns the value of its drainage virtues through its distending function, which stamps it by all odds the best method of anastomosis in all acute bowel obstructions where there is a large extent of bowel to be removed, in the old and feeble patient, in peritonitic bowel and where the circulation is questionable, as union will take place in such bowel by the Murphy button when trouble will often follow the use of any type of suture method.

REDUCTION OF FRACTURES AND DISLOCATIONS UNDER LOCAL ANESTHESIA

C. R. G. Forrester, M.D.

CHICAGO

FOR a number of years, in following so-called traumatic surgery, I have found that the fear most patients suffering from fractures or dislocations entertain is the necessity of taking a general anesthesia and not the setting or reduction of a bone condition.

I have experimented along the lines of nerve block for the purpose of reductions. It is rather difficult to carry out a program

of experimentation in this country because we are subject not only to professional, but also to public, criticism and even possible legal procedure, and are definitely handicapped.

While in Austria recently, I decided to see if any such work was being done there. Excellent letters from Franklin Martin, Director General of the American College of Surgeons, gave me access to every angle of investigation I might want to make. I was advised to meet Professor Lorenze Böhler who, I learned later, had for the last three years or more been making a special study in his hospital on the use of local anesthesia in the treatment of all traumatic bone and joint conditions.

Professor Böhler is Chief Surgeon of the Unfallkrankenhause, Vienna. He started three years ago working out a technique for the reduction of fractures and dislocations, whether simple or compound, under local anesthesia. I am frank to say that during my three weeks' stay he convinced me that it was not only a safe but a more than practical method. In fact I did not see one case treated in any other manner. He completely eliminated general anesthesia.

He goes on the theory that every fracture or dislocation produces its own hematoma and that this hematoma is the finest diffusing agent for a local anesthetic. He then carries it into practice to such an extent that it works out practically to the betterment of the patient. It eliminates postoperative pneumonia, passive or active congestion, shock, heart complications, alcoholic manifestations, etc. Many people who cannot afford prolonged hospitalization can be taken care of in this manner.

Since my return I have not put any fracture, simple or compound, or any dislocation, under general anesthesia and many of my patients have not had to go to the hospital at all.

I can see where this method will not only react satisfactorily on the minds of the patients, but from an economical standpoint in traumatic surgery, will help materially to cut down the medical and surgical overhead. I have demonstrated this thoroughly in the short time I have been using the method.

Professor Böhler's treatment of fractures in and near a joint are decidedly different from anything we have been taught, and in following out his ideas I have been able to eliminate the after care, such as massage, diathermy, etc., at least 50 per cent.

He uses exceedingly practical walking irons which he incorporates in the plaster of the lower extremities. These irons not only permit early weight bearing, but also keep the muscular and osseous structures in a much better state of nutrition than anything I have ever seen and I have since used them to my eminent satisfaction.

In many instances his method of treatment permits the so-called working man to carry on with his occupation while undergoing treatment.

Those who read this might question the danger of infection in using a local anesthesia, but I did not see one case of infection and since using the same technique I have had no infections.

Professor Böhler's local anesthesia in fractures of the extremities is a 2 per cent novocaine; in pelvic fractures he resorts to spinal analgesia and uses a 1 per cent novocaine.

In using plaster following reduction he applies it next to the skin claiming that padding, together with tissue shrinkage, allows of displacement.

I saw cases where plaster had been applied next to the skin and allowed to remain on for six to seven and eight weeks without any evidence of skin irritation or necrosis.

I have always felt that such a procedure was dangerous but, since learning his method and applying it myself, I find there is no fear of complications, but one must know the proper technique.

BRITISH LETTER

AN International Conference on Cancer was held in London in July. Delegates attended from the United States and most of the European Countries were represented. The Overseas

delegates were received by His Majesty the King at Buckingham Palace.

Four days were given to discussions and demonstrations at the following institutions: Royal Society of Medicine, Middlesex Hospital, Radium Institute, St. Bartholomew's Hospital, St. Mark's Hospital, Cancer Hospital, Westminster Hospital, Guy's Hospital, Lister Institute, Royal College of Surgeons, and the Wellcome Museum of Medical Science.

Amongst those from the United States taking an active part in the discussions were: William B. Coley, James Ewing, Burton D. Lee, W. C. MacCarthy, Franklin Martin, Joseph Muir, J. B. Murphy, Douglas Quick, Channing Simmons, Burton T. Simpson, Maud Slye and Francis C. Wood. The delegates from Canada were: H. A. Bruce, Gendreau, D. Graham, G. E. Richards, and H. W. Wookey.

A general discussion was opened by Blair Bell on the methods of treatment in malignant disease with special reference to lead. In his opening remarks he defines the term chemotherapy as indicating: "Treatment by synthetic preparations, which have a selective therapeutical action on abnormal tissues of the body, and on the organism that may infect it, with or without the production of associated constitutional phenomena."

He says that failing to discover the biological, that is the natural biochemical, regulators of differentiation, we must seek some substance that will arrest growth as such and endeavour to discover one that has also an inhibitory action on the essential functions of the cancer cell, or a selective affinity for some part of its chemical constitution, and some influence on its physicochemical state. In order to produce its effect it should be possible for the chemotherapeutical agent to be infected into the blood stream and it must reach the cancer cells.

Successful treatment with the method implies: (a) Destruction of the neoplastic cells. (b) Arrest of the growth, and possibly, (3) the redifferentiation of malignant into normal somatic tissue.

With regard to lead therapy in malignant disease he digresses briefly to explain that he regards malignant disease as a specific growth process of dedifferentiation, (implying a process initiated by many predisposing factors), the essential point being that this reversionary process is directed towards the trophoblastic type. He then refers to the fact that lead arrests growth generally and causes abortion, and also to his experiments showing that the growth of plants and animals is definitely checked by the substance, and that lead in suitable doses causes coagulation necrosis of the chorionic epithelium. He also states that he and others have obtained experimental and clinical evidence that lead may cause a similar necrosis of cancer cells in favourable circumstances. After treatment le ad has been found in the tumours in considerable quantity. In 2 cases of malignant tumors the lead content was shown definitely to exceed that found in the neighbouring tissue. He asserts that the problem of successful chemotherapy in malignant disease is one of extraordinary complexity, and maintains it is one which is worthy of careful investigation and exploitation.

In the discussion that followed, Basil Hume of St. Bartholomew's gave a summary of the results of the lead treatment on 20 patients who had been selected as having a malignant type of growth and not suitable for surgical measures. Lead treatment alone was given in 13 cases and 7 cases received a combined lead and roentgen-ray treatment. Hume sums up as follows:

1. As far as this limited investigation goes, no evidence has been obtained that the use of lead by intravenous injection leads to the resorption of neoplastic tissue in man.

2. The average duration of life in the patients treated by lead has been less than their expectation of life had they not been so treated; in several of the cases an immediate and grave deterioration in general health followed the treatment.

3. The histological appearances of the growth before and after lead treatment have

been indistinguishable. No evidence has been forthcoming that the growth has changed in character from a more to a less malignant type and vice versa.

4. As far as could be ascertained, none of the patients treated by lead during this investigation died directly as the result of acute or of chronic lead poisoning. In more cases in which definite information as to the cause of death was available this was brought about by the progress of the disease.

H. T. B. Fry (London) reported on the pathological changes found in cases of carcinoma treated with colloidal lead. He had the opportunity of examining the effects of colloidal lead upon the organs of the body in 11 cases which had received the treatment for cancer and were afterwards submitted to postmortem examination. He summarises his conclusions thus:

1. Colloidal lead, when used in the treatment of malignant disease causes definite pathological changes.

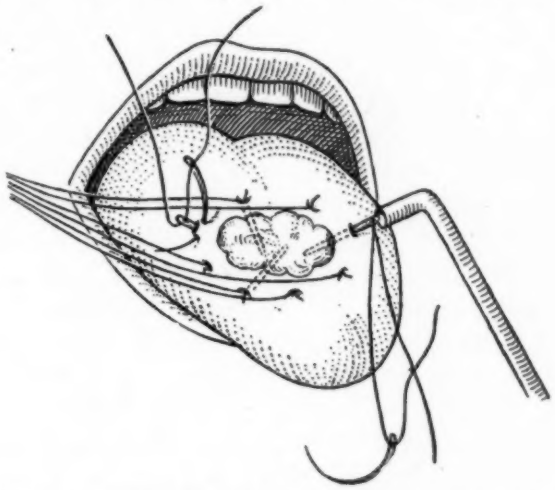
2. These changes are chiefly degeneration of the convoluted tubules of the kidneys and fatty degeneration in the liver.

3. No histological changes have been observed in growths as the result of lead treatment which are not also observed in untreated growths.

Blair Bell received a certain amount of support in his advocacy of the lead treatment from Carter Wood and Caspari (New York), but Burton T. Simpson (Buffalo) quoted very unsatisfactory results in some 31 cases in which the effects of the lead treatment had been observed, and concluded with the statement: "It seems as though lead as used by us is not the solution of the cancer problem."

This summing up, I think, conveys the impression left in the minds of the majority of those who attended the debate. Blair Bell's opening remarks emphasise the difficulties of lead treatment and the need of further investigation. His general statements, however, as to the safety and soundness of the principle were not altogether convincing.

The general trend of the debate afterwards was not favorable to the method and it was clearly indicated that it had been carefully tried out by other investigators



Method of introduction of radium needles. The silk suture is threaded through the radium needle. The needle is introduced into healthy tissue around the growth. The silk is then threaded through an ordinary needle and stitched so as to keep the radium in position. (After Stanford Cade.)

who declared, for the most part, that results were not only disappointing but led them to consider the method of little avail as a cure for cancer, and one that could be positively harmful by causing pathological changes in certain important organs.

There was a most interesting demonstration of cases at the Westminster Hospital on Thursday afternoon by Arthur Evans, M.S., F.R.C.S. and Stanford Cade, F.R.C.S., showing the result of radium treatment on some 23 patients; 14 had been treated for cancer of the tongue; 4 cases involving the larynx; 2, growths in the neck; 2, carcinoma of the urethra; 1, bilateral cancer of the breast.

The method of treatment was demonstrated for the primary growth in the tongue. Both lingual nerves are injected with 1 per cent novocaine and after duly noting the extent of the growth, a traction suture is introduced into the tongue, which is held by an assistant who also retracts

the cheek. The growth is then surrounded by radium needles. (Radium bromide equivalent to 0.6 mgrm. of radium element, the needle being 16 mm. long, diameter 1.65 mm. and screened by 0.5 mm. platinum, is used.) The needles are sutured in position with silk thread, the long ends collected and passed through a rubber tube, and carried round the angle of the mouth to be fixed by strapping to the cheek. To protect the adjacent bone a simple apparatus is made containing a sheet of lead 1 mm. thick covered with vulcanite or Stent's mass moulded over the jaws and teeth.

With regard to the glands in the neck Evans and Cade advise a very radical removal, if necessary on both sides, to be followed later by irradiation. A Columbium paste collar is moulded and applied to the neck at a distance of 3 to 1½ cm. from the skin, the radium being disposed in a series of needles over the surface.

The general procedure has evidently been based on French lines and the results are so overwhelmingly good that most of the surgeons who have had to deal in the past with these difficult cases by means of a mutilating operation (which is even then apt to be followed by a recurrence at no distant date) must realize the great advance in treatment this technique means and accept it or some modification of it as the best solution as yet for the cure of cancer of the tongue.

Apart from the general discussion on the etiology of cancer the various meetings were devoted to the consideration of the regional varieties of cancer and the practical and relative values of surgery and radiation in their treatment. The rapid advances made in the treatment of new growths by radiotherapy in the last ten or twelve years is remarkable and we owe much to the French school in which perhaps the most ardent pioneers have been C. Regaud of Paris and the late Bergonie of Bordeaux.

C. Regaud, speaking at the meeting, affirmed that the radio-sensitivity of cancers was extremely variable. He referred to the term "epidermoid epithelioma" which was used in Paris to describe a stratified pavement epithelioma which showed more or less the morphological changes or manner of growth peculiar to the epidermis. Such growths of the skin, mouth, cervix, uteri, and vagina formed a homogenous pathological group and displayed a similar behavior towards radiation. Of the two different species of cancer, epidermoid and glandular, in the same situation, for instance in the cervix uteri, cures by selective radiotherapy had only been obtained in the epidermoid type. The cause of this difference of behavior appeared to depend on the activity and rhythm of division on the one side and the secretory function on the other. There were, however, many other factors to consider.

In this last decade the work has been carried on also in America, Sweden, Belgium, Great Britain and other countries by numerous indefatigable and enthusiastic workers, the result being an evolution in treatment by radium and radiotherapy which has been so great and important that it is now considered a first line of treatment of carcinoma in certain regions for which formerly a radical surgical excision was thought to be the only feasible treatment.

John H. Watson, M.D., F.R.C.S.

Burnley, England.

THE AMERICAN COLLEGE OF SURGEONS EIGHTEENTH CLINICAL CONGRESS

THE American College of Surgeons will hold the eighteenth Clinical Congress in Boston, October 8–12. Headquarters will be at the Statler Hotel and meetings will be held in the ballroom of the Copley-Plaza Hotel and Symphony

Hall. The Hospital Standardization Conference will be held in morning and afternoon sessions in the ballroom of the Copley-Plaza Hotel Monday, Tuesday, Wednesday, and Thursday. An innovation this year will be the commencement of the clinics in the Boston hospitals on Monday afternoon, continuing through the mornings and afternoons of the following four days. Monday evening's program will include an address of welcome by the local Chairman, the address of the retiring President, Dr. George David Stewart, New York, the inaugural address of the new President, Dr. Franklin H. Martin, Chicago, and the John B. Murphy oration on surgery by Professor Vittorio Putti of Bologna, Italy. Tuesday, Wednesday and Thursday evenings' sessions will be held in the ballroom of the Copley-Plaza Hotel. At the Wednesday evening meeting the visiting surgeons will be the guests of the Boston Surgical Society at a special meeting when the Bigelow medal is to be awarded. On Friday evening the Annual Convocation of the College will be held in Symphony Hall when the 1928 class of candidates for Fellowship in the College will be received. The fellowship address on this evening will be delivered by Dr. William J. Mayo. The annual meeting of the Governors and Fellows will be held Friday afternoon and will be followed by a symposium on Traumatic Surgery to be participated in by leaders in industry, labor, indemnity organizations and the medical profession. Ether Day will be celebrated in the Dome Room of the Massachusetts General Hospital on Friday when a bronze bust of William T. A. Morton will be presented to the hospital. It was in this building that ether was first administered for the production of surgical anesthesia on October 16, 1846. Several newly completed medical motion pictures produced under the supervision of the American College of Surgeons and approved by it will be shown during the Congress. Reduced fares on the railways of the United States and Canada have been authorized to those holding a convention certificate so that the total fare for the round trip will be one and one-half the ordinary first class one-way fare. Other outstanding features will be the exhibits. In addition to the commercial exhibits the departments of the College will present scientific exhibits. A number of distinguished foreign guests of international reputation have signified their intention of attending. The Chairman of the Boston Committee on Arrangements is Dr. Frederic J. Cotton.

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[From Fernelius' Universa Medicina, Geneva, 1679.]

BOOKSHELF BROWSING

WILLIAM HARVEY*

ARCHIBALD MALLOCH, M.D., M.R.C.P. (LOND.)

NEW YORK

THE centenaries of three men whose work was much concerned with the vascular system are being celebrated this year: William Harvey, born three hundred and fifty years ago, whose masterpiece was published in 1628[1]; Marcello Malpighi, who was born in the latter year; and John Hunter who came into the world in 1728. The greatest of these is Harvey and I feel honoured and yet a little in despair before the immensity of the task of attempting to portray his life and work upon this occasion. I am grateful, however, that another excuse has been given me to study Harvey's writings more closely than heretofore.

In the process of time surnames become Christian names and it is fitting that you, Sir,* are Chairman tonight and that this gathering is held on the spot where your work and that of your assistants has done so much towards unravelling the mysteries of the third circulation—that of the cerebrospinal fluid.

EDUCATION AND APPOINTMENTS

William Harvey was born at Folkestone, Kent, on the 1st of April 1578, and, as Thomas Fuller[2] quaintly put it, he was the eldest of "a weeke of sons." His father was a person of some substance who later became jurat, or alderman. If we can believe her very eulogistic epitaph, William's mother could not have been better chosen. Young Harvey was educated at the King's School, Canterbury and was no doubt well drilled in the classics, for in later years he often quoted Virgil, his favourite poet, in his scientific writings. Possibly through his bent for natural history he was nominated to a scholarship preparing one for medicine at Gonville and Caius College, Cambridge, and he may have watched dissections there. As many a young man does today, Harvey passed through the three gates of the College, that of Humility, that of Virtue and that of Honour, and obtained his B.A. in 1597.

Padua had been the greatest school of medicine for some time and, like such great men as Linacre and John Caius, Harvey went to that place which Vesalius and others had made famous. Harvey entered on his medical course in 1600. The University was governed largely by the students of the different nationalities and Harvey was chosen *concilarius* of the

*Dr. Harvey Williams Cushing.

* Read before a joint meeting of the Harvard Medical Society and the Boston Medical History Club held at the Peter Bent Brigham Hospital, Boston, Mass., April 24, 1928, in celebration of the tercentenary of the publication of the "De motu cordis."

English "nation," an office which in 1652 John Finch said entailed being "drunk at least 40 times in the year." Was hospitality so abundant in Harvey's day? The students are remembered at Padua by tablets or stemmata upon the walls or roof of the cloisters and Harvey's and those of many other Englishmen and Scots are there. In 1593 as a tribute to Fabricius ab Aquapendente, Harvey's chief teacher, the Seignury of Venice had erected an anatomical theatre. The circular galleries with high carved oaken railings, behind which the students stood, rise in tiers almost straight to the roof and the absence of daylight adds an air of mystery to the room. The dissections under the direction of Fabricius were performed by candle light on subjects brought up through a trapdoor beneath the table. The young man and his teacher became warm friends, Harvey being stimulated most by Fabricius's discovery of the valves in the veins and his work on development. William Harvey was created M.D. on the 25th of April 1602 in the presence of several other Englishmen, some of whom made their mark later.

He returned to England in 1602 and took his Cambridge M.D. in the same year and in 1604 was admitted a candidate by examination to the Royal College of Physicians then in Linacre's house in Knightrider Street. Harvey became a Fellow in 1607. He took a house close to St. Bartholomew's Hospital and perhaps through an introduction from Inigo Jones, the famous architect, who had been born within the precincts of the hospital, he began to work there. In 1604 he married Elizabeth, daughter of Dr. Lancelot Browne physician in turn to Queen Elizabeth and James I. The Harveys had no children and we know little of Mrs. Harvey except that she had a tame parrot and was "tall, of a dark complexion and somewhat severe aspect." One day the parrot died and the joke was on its mistress and especially on its master, the father of English midwifery and great embryologist, for a dissection revealed that it was not a gentleman bird as supposed, but a lady one!

Through a letter from James I, probably

Fig. 1. Harvey's stemma at Padua.

obtained through the influence of John Harvey, William's brother, who was footman to his Majesty, Harvey was appointed assistant physician to St. Bartholomew's Hospital in 1609. Harvey never lived within the bounds of the hospital.

He began to build up a practice and we know he had many patients in the higher walks of life, but he must have been continually carrying out dissections and observations upon all kinds of animals for he dissected eighty different species. On the 4th of August, 1615, he was elected Lumleian Lecturer at the College. These lectures were founded by Dr. Richard Caldwell and Lord Lumley in 1581 and are still delivered, no longer as a long course and the subject of them is not restricted to anatomy and surgery. The whole course

in Harvey's time was gone through every six years. William Harvey, then in his thirty-seventh year, began his anatomical

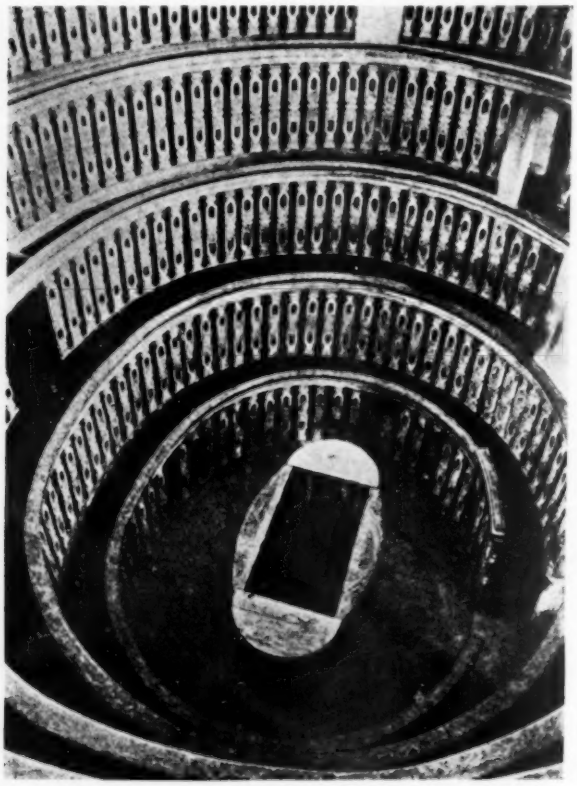

Fig. 2. The anatomical theatre of Fabricius at Padua.

lectures on April 16th, 17th and 18th, 1616, in the anatomical theatre adjoining Linacre's house in Knightrider Street, before about forty physicians of the College and a few laymen.

HARVEY'S LECTURE NOTES

It is fortunate that his autograph notes for his lectures are preserved in the British Museum and some of them were reproduced in facsimile with transcription by a committee of the Royal College of Physicians in 1886.[3] The writing of the title-page is in red ink and is scarcely legible. Across the top is written a phrase from the third Eclogue of Virgil, which Sir Norman Moore translates, "From God all begins: all things are full of God," an idea to which Harvey returns in his work on generation[4] where he writes of his belief in an Omnipotent Being. Below the title is written a quotation from Aristotle's "Historia animalium" in which the study of the inner parts of animals is recommended to aid one to understand the human organism, and it was just by following this advice and employing the method of comparative study that the gifted Harvey was enabled to make those extraordinary discoveries in physiology and embryology.

These notes are written on both sides of about a hundred small pieces of paper. Harvey wrote an atrocious, crabbed hand and the notes are rendered still more difficult to read since the sentences are not completed and many Latin words and phrases appear in the midst of English ones. His initials WH are placed in a monogram, ℔, before any statement which he thought peculiarly his own and a capital delta, Δ, stands for the phrase, "it is demonstrated." This precious volume of notes contains eleven rules which Harvey laid down for himself in delivering lectures; all of them are worth quoting but I shall give six only:

2. To point out what is peculiar to the actual body which is being dissected. [In this way anomalies and also pathological lesions would not be lost sight of.]

3. To supply only by speech what cannot be shown on your own credit and "by authority."

4. To cut up as much as may be in sight of the audience.

6. Not to praise or dispraise other anatomists, for all did well, and there was some excuse for those who are in error.

8. To state things briefly and plainly, yet not letting anything pass unmentioned which can be seen.

9. Not to speak of anything which can be as well explained without the body or can be read at home.[5]

The skin, outward form of the body, the abdomen, and the thorax in their anatomical, physiological, and pathological aspects are treated of in these lectures. Nine pages, in all, deal with the vascular system. Folio 80 verso, the now well-known page, gives in brief his enunciation of the circulation. Charles Singer[6] has

translated these rather untranslatable notes as follows:

On account of the structure of the heart, William Harvey is of the opinion that the blood is constantly passed through the lungs into the aorta, as by two clacks of a water bellows to raise water. Moreover, on account of the action of a bandage on the vessels of the arm he is of the opinion that there is a transit of blood from the arteries to the veins. It is thus demonstrated that a perpetual motion of the blood in a circle is brought about by the beat of the heart. What shall we say? Is this for the purpose of nutrition? Or is it for the better preservation of the blood and of the members by imparting heat to them, the blood by turns losing heat as it warms the members, and gaining heat from the heart?

In these notes as well as in the published writings of Harvey we can see the authors he had read. Aristotle and Galen are the most frequently mentioned in the "Prelectiones." Hippocrates is quoted and it is plain that he has read Plautus, Terence, Vitruvius, Plutarch, Caesar, Cicero, Ecclesiastes, St. Augustine, Avicenna, Averrhoes Erasistratus, Oribasius, Herophilus. He mentions Vesalius, Realdus Columbus, Fallopius, Fabricius, Bauhin, Fernel, Cardan, Benivieni, and many others. The names of Dr. Gilbert and other physicians of his time occur, also those of many of his noble or knightly patients and even members of his own family.

Harvey uses homely but refreshingly vivid figures of speech to make his points and these lecture notes form one of the most human documents I know. For instance, he compares desquamation after scarlet fever with the scaling of feather sheathes from a bird then living in the Royal collection in St. James's Park; and the succession of names for different parts of the intestine suggests the various names of the same street as you pass from St. Paul's to Leadenhall—Cheap, Poultry, and the rest. He mentions football, bear-baiting, and cockfighting, the ballet, tumblers, and rope makers and apparently a man who could "break buttons" by expanding his chest. He suggests cutting the laces of young girls whose livers are being deformed. He says "the best fashion to lep to run to doe anything [is to] stripp to y^{e} scin"[7] and "Fashion is but copertura redundantiae dispositio fantastica"[8] in his judgment. He compares acid eructations rising up from the stomach with motions from the Lower to the Upper House of Parliament. Following the sentence "Yf I could shew what I hav seene y^{t} weare att an end between physicians et philosophers,"[9] Harvey states that the blood is rather to be regarded as the author of the liver than the liver of the blood and adds: "Anima est in sanguine,"[10] the soul or life is in the blood.

Harvey's little whalebone pointer or wand tipped with silver, used by him at his lectures, is one of the most treasured possessions in the Royal College of Physicians.

A DAY WITH HARVEY

Harvey was appointed Physician Extraordinary to James I in 1618 and later was Physician to Charles I and on terms of warm friendship with him. Sir Benjamin Ward Richardson[11] has left us what might be called "A Day in the Life of Harvey." We see him entering St. Bartholomew's Hospital, examining patients there in the large hall, riding on horseback followed by two runners who spread out the footcloth when he alights at St. James's Palace where he visits the King. We accompany him as he rides to see his patients and when he goes to visit his merchant brothers in the City. Then we make our way back with him as far as Amen Corner to the Royal College of Physicians and here Harvey delivers a lecture. The Fellows banquet together in their common hall and we find that Harvey is on the best of terms with, and honoured by, his friends. Finally we go along with him to his house not far off and follow him into his library where he consults his favourite authors Aristotle and Galen; and before he falls asleep in bed he

reads a passage from Virgil who was his constant companion.

Benjamin Ward Richardson makes use of the following description of Harvey written by John Aubrey:

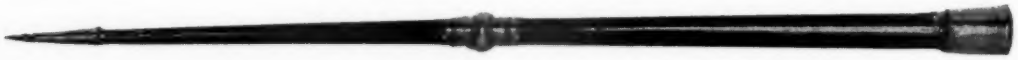

Fig. 3. Harvey's pointer or wand used at his lectures. (Reproduced by permission of the Royal College of Physicians.)

He was, as all the rest of the brothers, very cholerique; and in his younger days would be apt to drawe out his dagger upon every light occasion. He was not tall, but of the lowest stature; round faced, olivaster (like wainscott) complexion; little eie, round, very black; full of spirit; his hair was black as a raven, but quite white 20 years before he died.

I do not believe that Harvey lost his temper so easily as Aubrey tells us except when a fit of gout or sciatica was upon him but believe rather that he handled his dagger playfully when conversing with others.

Fig. 4. Harvey demonstrating to Charles I his discovery of the circulation of the blood.

THE DE MOTU IS PRINTED

In 1628 Harvey's book, "Exercitatio anatomica de motu cordis et sanguinis in animalibus," was published at Frankfurt by Wilhelm Fitzer. It is a small quarto volume of seventy-two pages plus one and a quarter of errata, but it is one of the most important medical books if not the most important one. Albrecht von Haller has called it *libellus aureus*[12] and Flourens,[13] *le plus beau livre de physiologie*, and to us now these do not seem to be extravagant phrases.

We have seen that in 1616 in his Lumleian Lectures,[14] in the last of the nine pages dealing with the heart and blood vessels, Harvey describes the circulation of the blood. Why was it then, that his doctrine remained unpublished for twelve years? Underhill[15] in 1905 threw out the interesting suggestion that folio 80, both recto and verso of which are remarkably clean and show few alterations, was slipped into the "Prelectiones" or notes, at a later date, and thus that Harvey did not express his view until some time after 1616. I wrote to the Keeper of Manuscripts at the British Museum and Mr. J. P. Gilson replies:

> I can see no external evidence tending to show that f.80 recto is not a direct continuation of what precedes. The paper (though it has no watermark) has the appearance of being identical with the rest of the book. That the passage on the verso of f.80 [where the circulation is described] may be an after thought is however a possibility (whether probable or not must depend on internal evidence) for it does look as if written with different ink and probably another pen. But there are other cases in which variations of ink strength occur, *e.g.* at top of f.56 verso, which scarcely admit of being regarded as additions (on the other hand see 44 verso). The character of these passages would need to be investigated by an expert anatomist to form an opinion.

In the address[16] to Dr. Argent, President of the Royal College of Physicians, and his colleagues which follows the dedication, Harvey speaks of his views having already been confirmed many times "per

novem et amplius annos," for nine years and more. Now this would throw the discovery back to 1619 or 1618. Huxley thought that as Harvey was a careful writer we must believe that he did not wish to lay claim to having enunciated his complete views before that time. At any rate Harvey admits having these ideas for eight or nine years and he forms a good example of one who did not rush into print,—it is a great temptation to us all. William Osler[17] in his Harveian Oration of 1906 considered the point and said, "Perhaps it was the motive of Copernicus, who so dreaded the prejudices of mankind that for thirty years he is said to have detained in his closet the 'Treatise of Revolutions.'" Listen also to Harvey's lament:

. . . the crowd of foolish scribblers is scarcely less than the swarms of flies in the height of summer, and threatens with their crude and flimsy productions to stifle us as with smoke.[18]

EXERCITATIO
ANATOMICA DE
MOTV CORDIS ET SAN-
GVINIS IN ANIMALI-
BVS,
GVILIELMI HARVEI ANGLI,
Medici Regii, & Professoris Anatomiæ in Col-
legio Medicorum Londinensi.
FRANCOFVRTI,
Sumptibus GVILIELMI FITZERI.
ANNO M. DC. XXVIII.

Fig. 5. Title page of the first edition of the "De motu cordis."

It is interesting to speculate also why the great book was printed and published at Frankfurt. I cannot find that Wilhelm Fitzer[19] ever published any other important medical or other scientific books. It is a thousand pities that it is not a very good piece of bookmaking. I have examined several copies of the book and, as others have also remarked, I have scarcely seen one of which the leaves were not badly discoloured or foxed. There seems to have been some very poor paper used in Germany about that time, for I came across

in our library a copy of Michael Potier's[20] "Philosophia pura . . . " printed at Frankfurt in 1619, octavo, and, throughout

Fig. 6. W. C. Edward's engraving after Jansen's portrait of Harvey in the Royal College of Physicians, London.

almost the whole book, the leaves, also made of poor paper, are foxed just as in Harvey's work printed nine years later. Did the Thirty Years War account for this poor quality of material? On the other hand, the paper of the first edition of Harvey[21] in English printed in London by Francis Leach, for Richard Lowndes in 1653 has remained in very good condition. Up to 1824 there were about 16 Latin, 2 English, and 1 Dutch edition; at least one other in Latin and two in English will appear in 1928.

HARVEY'S PREDECESSORS

Whole books have been written about the growth of our knowledge of the circulation and here we can merely touch lightly upon the most important contributions to the subject. Hippocrates[22] (about 400 B.C.) recognized that the heart was a muscle and attributed the pulse to a movement of the blood vessels. Aristotle[23] (*fl.* 350 B.C.) held that the heart was the centre of the vascular system but for him it was also the focus of the heat of the body and the seat of intelligence. A little later Erasistratus of the Alexandrian school described the valves of the heart but he erred when he thought that the arteries contained air. Galen[24] (*fl.* 180 A.D.), Harvey calls him "the divine Galen,"[25] was the first great experimental physiologist who dared to tie an artery in two places and incise it to show that it contained no air but blood only. According to him the liver was the centre of the venous system and the blood ebbed and flowed in tides from it in the veins carrying the *natural spirits* which were formed in the liver from the chyme brought to it. Part of the blood then passed through the right heart and the pulmonary artery to the lungs to nourish them and here the "fumes or sooty excreta" were removed by expiration. Most of the blood on reaching the right side of the heart passed through invisible pores in the septum. When the left ventricle dilated, air was sucked into it from the lungs and in the presence of the innate heat of the heart *vital spirits* were formed; this air also prevented the heat from becoming too great. The *vital spirits* were carried by the blood in the arteries by ebb and flow to and from all parts of the body to make possible the functions of the organs. On reaching the brain the *vital* generated the *animal spirits* which passed out along the nerves to bring about movement and sensation, etc. Leonardo da Vinci[26] (*fl.* 1500) distended the lungs with air and proved that none went directly into the pulmonary veins and thence into the heart, thus he was the first to question Galen's views. His drawings show how often he worked at the heart; he describes four chambers and recognized that the valves at the roots of the two great arteries prevented blood regurgitating into that organ and he seems to doubt that the blood

passed through the interventricular septum. It is difficult to say what influence he had upon those who followed immediately after him, for his drawings, which show flashes of a brilliant mind, remained unpublished for centuries.

Vesalius,[27] the father of modern anatomy, in the first edition of his "Fabrica" (1543) hinted that he doubted that the blood passed through the septum and in the second edition (1555)[28] states he could not find any channels from one ventricle to the other. Servetus[29] in the midst of his theological and heretical book "Christianismi restitutio" (1553), which caused his death, described the circulation of the blood through the lungs, or the lesser circulation. Servetus knew of the change of colour which the blood undergoes in the lungs but he had no conception of the heart as a pumping organ. The book may have been circulated in manuscript and have reached other scientific workers but this is doubtful and practically all copies of the printed word were burnt with him, only three being known to exist now. Realdus Columbus of Padua, whom Harvey refers to as "that skilful and learned anatomist,"[30] in his "De re anatomica" (1559)[31] did not believe that the heart was a muscle but he denied the passage of blood through the septum. He described the lesser circulation and added that this fact had never been observed before or recorded; it is probable, then, that he was not acquainted with the book of Servetus of six years previous. Cesalpinus in his "Peripateticarum quaestionum" (1571)[32] and "Quaestionum medicarum" (1591)[33] wrote that in systole the heart sent blood into the aorta and on dilating, blood flowed into it from the vena cava. He was, it is true, the first to use the word "circulation" and he knew that when a ligature is tied, for the purpose of bleeding, the veins swell *beyond* it. He thought, however, that the heart was not a muscle and also that the septum was porous. Sir Michael Foster[34] says we must admit that he "clearly grasped the pulmonary circulation, but had also laid hold of the systemic circulation. . . But the question may fairly be asked, How far were these views the outcome of patient research, of real study of the phenomena themselves? How far were they flung out in the spirit of controversy as effective assaults upon accepted doctrines?" And Foster is inclined to the latter view. Only after years and years, not until after 1670, as Fraser Harris[35] has shown, were they disinterred, so to speak. Fabricius ab Aquapendente, like Vesalius, professor of anatomy at Padua, was, as we know, Harvey's teacher. In 1603 he published his book "De venarum ostiolis,"[36] on the valves of the veins, but he failed to see their true use, thinking they were merely to prevent all the blood from flowing in the veins to the feet or hands. He did not understand that these valves are so tight-fitting that they effectually prevent any blood flowing in a direction away from the heart. He was a good observer up to a point and Robert Boyle[37] related that it was these valves that made Harvey think hard about the movement of the blood, and first led him to investigate the subject.

Flourens[38] has given us an explanation of why progress was so slow towards the discovery of the circulation and we may use it as a sort of summary of our sketch of the history of the subject. Three errors stood in the way:

1. The arteries contained air
2. The interventricular septum was perforated, and
3. The veins carried blood to the periphery.

FORM AND CONTENTS OF THE DE MOTU

Harvey's book opens with a graceful dedication to Charles I in which a king as centre of the body politic is likened to the heart of man. Then an address to the President and physicians of the College follows, taking up about four pages. Harvey finds that true philosophers accept

truth whencesoever it may come, "neither do they swear fealty to their mistress Antiquity, that they openly, and in sight of all, deny and desert their friend Truth."[39] He professes "both to learn and to teach anatomy, not from books but from dissections; not from the positions of philosophers but from the fabric of nature."[40] As if on second thought, a little shy and timid on account of his boldness in telling of his discovery, he closes with the phrase "Farewell, most worthy Doctors, and think kindly of your Anatomist, William Harvey."[41]

The book proper consists of an introduction of ten pages and seventeen chapters. The introduction tells of the older views of the vascular system, and I must quote one sentence which goes far to remove one of the three obstacles referred to above: "Besides, if the blood could permeate the substance of the septum, or could be imbibed from the ventricles, what use were there for the coronary artery and vein, branches of which proceed to the septum itself, or supply it with nourishment?"[42]

Harvey's work is upon the motion of the heart and blood and I think perhaps we are inclined to remember that he dealt with the latter and to forget the former. He had such a sharp pair of eyes that he saw exactly what happens when the heart contracts and although he could not make this out at first in the heart of large warm-blooded animals, he went to toads, frogs, serpents, small fish, etc. where the movements were "slower and rarer." He saw that the heart was muscle and became paler when it squeezed the blood out of it. Let me quote an important paragraph:

> These things, therefore, happen together or at the same instant: the tension of the heart, the pulse of its apex, which is felt externally by its striking against the chest, the thickening of its parietes, and the forcible expulsion of the blood it contains by the constriction of its ventricles.[43]

He saw, too, that the auricles contract before the ventricles, driving the blood into the latter, that blood was forced out from the ventricles into the aorta and into the pulmonary artery, and that during diastole the heart was filled afresh. When he had gone so far, he knew that the heart was a pump, and he had gone a long way towards answering that great question which he had set himself. He noted further "in opposition to commonly received opinions" that "the arteries are filled and distended by the blood forced into them by the contraction of the ventricles; the arteries, therefore, are distended, because they are filled like sacs or bladders, and are not filled because they expand like bellows."[44] Observations of clinical cases were constantly drawn upon to support a thesis and in the case of an aneurism he writes that "the pulse in the corresponding arm was small, in consequence of the greater portion of the blood being diverted into the tumour and so intercepted;"[45] and perhaps he has described fibrillation of the auricles:

> Besides this, however, I have occasionally observed, after the heart and even its right auricle had ceased pulsating,—when it was *in articulo mortis* in short, that an obscure motion, an undulation or palpitation, remained in the blood itself, which was contained in the right auricle, this being apparent so long as it was imbued with heat and spirit.[46]

He likens the course of systole in the heart to what happens when the trigger of a flintlock is pressed:

> These two motions, one of the ventricles, another of the auricles, take place consecutively, but in such a manner that there is a kind of harmony and rhythm preserved between them, the two concurring in such wise that but one motion is apparent, especially in the warmer blooded animals, in which the movements in question are rapid. Nor is this for any other reason than it is in a piece of machinery, in which, though one wheel gives motion to another, yet all the wheels seem to move simultaneously; or in that mechanical contrivance which is adapted to firearms, where the trigger being touched, down comes the flint, strikes the steel, elicits a spark, which falling among the powder, it is ignited, upon which the flame extends, enters the barrel, causes the explosion, propels the ball, and the mark is attained—all

of which incidents, by reason of the celerity with which they happen, seem to take place in the twinkling of an eye.[47]

We now know that contraction starts in nodal tissue at the root of the vena cava but we could not express the sequence of events more picturesquely.

Harvey tells us why anatomists before his time did not learn the true nature of things as he did:

> Had anatomists only been as conversant with the dissection of the lower animals as they are with that of the human body, the matters that have hitherto kept them in a perplexity of doubt would, in my opinion, have met them freed from every kind of difficulty.[48]

But surely he is more than charitable, for even if they had examined lower animals, they would not have had Harvey's eye and brain!

THE CIRCULATION IS DESCRIBED

We now reach the eighth chapter where, as on folio 80 verso of his "Prelectiones," he puts into words his view of the nature of the movement of the blood. Vesalius before him had dared to stand up boldly against the authority of the masters of antiquity, especially Galen and Aristotle. It is hard for us to realize that before the revival of learning the authority of Aristotle had been sought in the schools of the West "from a Latin translation of a Hebrew translation of an Arab commentary upon an Arab translation of a Syriac translation of the Greek text."[49] Transmitted, dispersed and distorted as the light was in passing through these media, yet it was almost worshipped for centuries. Here are the feelings of Harvey as he dared to stand alone:

> But what remains to be said upon the quantity and source of the blood which thus passes, is of so novel and unheard-of character, that I not only fear injury to myself from the envy of a few, but I tremble lest I have mankind at large for my enemies, so much doth wont and custom, that become as another nature, and doctrine once sown and that hath struck deep root, and respect for antiquity influence all men: Still the die is cast, and my trust is in my love of truth, and the candour that inheres in cultivated minds. And sooth to say, when I surveyed my mass of evidence, whether derived from vivisections, and my various reflections on them, or from the ventricles of the heart and the vessels that enter into and issue from them, the symmetry and size of these conduits—for nature doing nothing in vain, would never have given them so large a relative size without a purpose,—or from the arrangement and intimate structure of the valves in particular, and of the other parts of the heart in general, with many things besides, I frequently and seriously bethought me, and long revolved in my mind, what might be the quantity of blood which was transmitted, in how short a time its passage might be effected, and the like; and not finding it possible that this could be supplied by the juices of the ingested aliment without the veins on the one hand becoming drained, and the arteries on the other getting ruptured through the excessive charge of blood, unless the blood should somehow find its way from the arteries into the veins, and so return to the right side of the heart; I began to think whether there might not be A MOTION, AS IT WERE, IN A CIRCLE. Now this I afterwards found to be true; and I finally saw that the blood, forced by the action of the left ventricle into the arteries, was distributed to the body at large, and its several parts, in the same manner as it is sent through the lungs, impelled by the right ventricle into the pulmonary artery, and that it then passed through the veins and along the vena cava, and so round to the left ventricle in the manner already indicated.[50]

And yet the burden of the Stagyrite's authority was still upon him for immediately afterwards he returns to him:

> Which motion we may be allowed to call circular, in the same way as Aristotle says that the air and the rain emulate the circular motion of the superior bodies; for the moist earth, warmed by the sun, evaporates; the vapours drawn upwards are condensed, and descending in the form of rain, moisten the earth again; and by this arrangement are generations of living things produced; and in like manner too are tempests and meteors engendered by the

circular motion, and by the approach and recession of the sun.

And so, in all likelihood, does it come to pass in the body, through the motion of the blood; the various parts are nourished, cherished, quickened by the warmer, more perfect, vaporous, spirituous, and, as I may say, alimentive blood; which, on the contrary, in contact with these parts becomes cooled, coagulated, and, so to speak, effete; whence it returns to its sovereign the heart, as if to its source, or to the inmost home of the body, there to recover its state of excellence or perfection. Here it resumes its due fluidity and receives an infusion of natural heat—powerful, fervid, a kind of treasury of life, and is impregnated with spirits, and it might be said with balsam; and thence it is again dispersed; and all this depends on the motion and action of the heart.

The heart, consequently, is the beginning of life; the sun of the microcosm, even as the sun in his turn might well be designated the heart of the world; for it is the heart by whose virtue and pulse the blood is moved, perfected, made apt to nourish, and is preserved from corruption and coagulation; it is the household divinity which, discharging its function, nourishes, cherishes, quickens the whole body, and is indeed the foundation of life, the source of all action. But of these things we shall speak more opportunely when we come to speculate upon the final cause of this motion of the heart.[51]

As John G. Curtis[52] has pointed out, Harvey again and again in this book returns to the question of the physiological primacy of the heart versus the primacy of the blood, as he does in his "Prelectiones," and in that on the "Generation of Animals." Sometimes for him, as with Aristotle, the heart is primary, and sometimes the blood, harking back to a Greek doctrine older than Aristotle himself, regarding it as the very seat of the soul. For Harvey, the heart beat is caused by the swelling of hot blood, but if this were so, how does he explain that the empty heart may contract as he observed? He does not recognize the sucking action of the dilating chambers of the heart. Respiration was a knotty point for Harvey and he ends "with a practical confession of ignorance." He states, "it is no less plain why the blood of the lungs is so ruddy; for it is thinner, because there it has filtered through."[53] And in his old age he questions, if he does not deny, the cooling effects of respiration. There is a marginal note, too, in his "Prelectiones;" "Why and how air is needed by animals which breathe and also air is necessary to a candle and to fire see WH."[54] This question might have been taken up in his promised treatise on respiration. He also did not see that respiratory movements were an aid to the circulation.

All this does not take away from his power as an observer, but as a speculator we might liken him to those who preceded him in physiology by two thousand years. He went as far as scientific conditions of his time allowed and are we not today still limited in outlook? Harvey was as conscious of this as we are and later wrote in a letter to John Daniel Horst: ". . . nor do I doubt but that many things still lie hidden in Democritus's well that are destined to be drawn into the light by the indefatiguable diligence of coming ages."[55]

FURTHER PROOFS

Harvey proceeds in the ninth chapter to show and to measure the amount of blood the left ventricle would hold. And assuming that only a fourth, a sixth, or an eighth part of it is sent out into the aorta with each beat of the heart and multiplying the smallest of these fractions, say one drachm, by the number of heartbeats in half an hour we find that during that time more blood has passed out of the heart than can be accounted for by all the blood in the whole body. And again reckoning the amount of blood sent out by the heart in the course of a day, it is found that it cannot be accounted for by all the food ingested. "In short," he says in this masterful chapter, "it could be furnished in no other way than by making a circuit and returning."[56] As further proof of a circulation, Harvey points out that:

Butchers are well aware of the fact and can bear witness to it, for, cutting the throat of an ox and so dividing the vessels of the neck, in less than a quarter of an hour they have all the vessels bloodless—the whole mass of blood has escaped.[57]

And Harvey shows, if only an artery of an animal is cut, how quickly both veins and arteries are completely emptied.

Thus we see, as Huxley[58] pointed out, that this book, "contains the first application of quantitative considerations to a physiological problem." And we are reminded of Lord Kelvin's[59] view on the quantitative method in science:

Accurate and minute measurement seems to the non-scientific imagination a less lofty and dignified work than looking for something new. Yet nearly all the grandest discoveries of science have been the rewards of accurate measurement and patient, long-continued labour in the minute sifting of numerical results.

Harvey's view of the circulation from heart, to artery, to vein, to heart is confirmed again in another passage:

If a live snake be laid open, the heart will be seen pulsating quietly, distinctly, for more than an hour, moving like a worm, contracting in its longitudinal dimensions (for it is of an oblong shape), and propelling its contents; becoming a paler colour in the systole, of a deeper tint in the diastole; and almost all things else by which I have already said that the truth I contend for is established, only that here everything takes place more slowly, and is more distinct. This point in particular may be observed more clearly than the noonday sun: the vena cava enters the heart at its lower part, the artery quits it at the superior part; the vein being now seized either with forceps or between the finger and thumb, and the course of the blood for some space below the heart interrupted, you will perceive the part that intervenes between the fingers and the heart almost immediately to become empty, the blood being exhausted by the action of the heart; at the same time the heart will become of a much paler colour, even in its state of dilatation, than it was before; it is also smaller than at first, from wanting blood; and then it begins to beat more slowly, so that it seems at length as if it were about to die. But the impediment to the flow of blood being removed, instantly the colour and the size of the heart are restored.

If, on the contrary, the artery instead of the vein be compressed or tied, you will observe the part between the obstacle and the heart, and the heart itself, to become inordinately distended, to assume a deep purple or even livid colour, and at length to be so much oppressed with blood that you will believe it about to be choked; but the obstacle removed, all things immediately return to their pristine state—the heart to its colour, size, stroke, &c.[60]

He now turns to what was known implicitly but not explicitly before by those who applied ligatures, the uses of these and fillets tied about the limbs in bleeding being explained. He shows how ligatures may be employed to stop hemorrhage and again to induce sloughing and more extensive mortification in castration or in the removal of warts and fleshy tumours. And he notes the different effects found by applying tight or "middling" ligatures to the limbs, the former cutting off the pulse of the arteries, the latter blocking the flow in the veins; and how on loosening a tight ligature the pulse may again be felt distal to it and on loosening a "middling" one, the tumidity of the veins beyond it vanishes and the part regains its normal colour.

One portrait of Harvey,[61] but it is doubtful if it is a contemporary one, shows that he possessed a microscope of the compound type as was pointed out to Sir Frederick Andrewes[62] and mentioned in his Harveian Oration of 1920; but Harvey makes no mention of it and if it had been of great service to him we should think he would have said so. He did not see capillaries, denied the form of anastomoses of Galen, and believed that the blood passed through frequent porosities (*porositates*). The London bookseller Nock,[63] in opposition to Willis, held that by *porositates* Harvey meant "walled channels." He knew the passages of arteries to veins must be numerous for with a "middling" ligature or fillet applied above the elbow,

"if any single small vein be pricked with a lancet, they all speedily shrink, disburthenning themselves into this they subside almost simultaneously."[64] It remained for Malpighi, born in the very year that Harvey's great work appeared, to supply the missing element in the investigations of Harvey, for in his book "Observationes anatomicae de pulmonibus"[65] published in 1661 he described how he saw the capillaries of the lesser or pulmonary circulation. In 1688 Leeuwenhoek[66] not only observed the systemic capillary circulation but also saw the blood corpuscles actually passing through the tiny capillaries.

In the thirteenth chapter Harvey shows the true use of the valves in veins and here his book has two plates. He applied a middling fillet just above the elbow whereby the veins were distended and the sites of the valves rendered visible. By placing the finger on a vein just above one knot made by a valve and emptying a small portion of vein above this with another finger he showed that blood could be pushed beyond the next valve above but would not flow back, and could not be made to flow back again, below it. The vein between the upper valve and the finger applied on the vein below remained flat and empty. But if the finger was taken away from the vein just above the lower valve, blood from the hand immediately flowed up into the empty portion of the vessel. These and other like observations of Harvey prove conclusively the functions of the valves. Harvey is also aware of the help given by motion of the extremities and contraction of the muscles in aiding the return of blood through the veins.

In the sixteenth chapter Harvey, as he says, proves the circulation of the blood by other consequences. He saw that the whole system was contaminated by "contagions," poisoned wounds, bites of serpents and rabid animals, lues venerea, etc., and also:

When we perceive, further, that medicines applied externally exert their influence on the body just as if they had been taken internally, the truth we are contending for is confirmed. Colocynth and aloes (applied externally) move the belly, cantharides excites the urine, garlic applies to the soles of the feet assists expectoration, cordials strength, and an infinite number of examples of the same kind might be cited.[67]

He describes, too, how many problems may be solved once the theory of the circulation is accepted:

Finally, reflecting on every part of medicine, physiology, pathology, semeiotics, therapeutics, when I see how many questions can be answered, how many doubts resolved, how much obscurity illustrated, by the truth we have declared, the light we have made to shine, I see a field of such vast extent in which I might proceed so far, and expatiate so widely, that this my tractate would not only swell out into a volume, which was beyond my purpose, but my whole life, perchance, would not suffice for its completion.[68]

In his epistle to Riolan Harvey[69] shows he cannot accept the view of Asseli who discovered the lacteals of the mesentery in 1622. Here it is interesting to quote a characteristic passage from Sir William Osler's Harveian Oration "The Growth of Truth" (1906):

How eminent soever a man may become in science, he is very apt to carry with him errors which were in vogue when he was young—errors that darken his understanding, and make him incapable of accepting even the most obvious truths. It is a great consolation to know that even Harvey came within the range of this law—in the matter of the lymphatic system—it is the most human touch in his career.[70]

It was through one of those ironies of fate that Harvey examined James Primrose in 1629 for entrance into the Royal College of Physicians and passed him, for the very next year the examinee[71] published his "Exercitationes, et animadversiones in librum, Gulielmi Harvaei de motu cordis et circulatione sanguinis," London, quarto. Examiners are prone to ask questions upon subjects in which they are themselves interested, as every student knows, and it is amusing to speculate whether Harvey

drew Primrose out on aspects of the circulation which were uppermost in his own mind. At any rate Harvey disdained to take the slightest notice of this book, written it is true, by a pupil of Riolan. It has been said that this work by Primrose "appeals not once to experiment as a means of investigation."[72]*

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* To be concluded in the October issue of the Journal.

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BOOK REVIEWS

The Eye[1] is an attempt to present the necessary knowledge of the subject to readers of two types, the general practitioner and the undergraduate in medicine. There is all that the undergraduate needs and more, but the subject matter is presented in such a systematic and logical manner that it will, we are sure, make a positive appeal to both the student and the teacher.

Even cursory examination will convince the man of general practice that here is a book which might well have been written by an intelligent internist who was also a very competent ophthalmologist, and that the book should be a part of every physician's library.

In a review of this length it is impossible to go into details. Suffice it to say that the general appearance of the book is attractive, the illustrations are definitive and well chosen, and the text is excellent.

The text in front of us is termed Clinical Medicine[2] and evidently the author has attempted to transcribe his individual ideas of treatment into cold text matter for the benefit of others. It is evidently a record of what Dr. Bethea is doing and has done in his own practice.

Perhaps books of this type are essential but to the writer this type of text appears to be one which takes from the individual all incentive to master the art of medicine and makes of him an artisan using the ideas of others.

Moreover, no one man can any longer cover the whole gamut of practice and do it justice. There are sections in the book which one can read with interest. Other sections immediately impress one with the idea that the author has gone to outside sources for his material.

For the man who wishes a brief outline of practically the entire field of internal medicine, with the emphasis throughout placed on treatment, this volume may carry a very positive appeal, but the man who believes that "treatment is the last step in a long process of reasoning," will not be satisfied with this book.

Undoubtedly many men are practicing medicine who will consider this the exact type of quick reference book for which they have been looking and to the man who admits (to himself) his lack of knowledge of therapeutic agents and their actions, the book will probably prove a benefit.

The Nose, Throat and Ear[1] is a new volume which is an earnest attempt on the part of the author to present the "essential facts" of his subject to the general practitioner and, we anticipate, will be warmly welcomed.

The author's position in his chosen specialty, his background of general practice, and his conventional form of presenting what he has to say, all blend to make this volume a practical book for its intended group of readers.

The inclusion of considerations about environmental conditions will be appreciated, and the results of focal infections of the nose, throat and ear here presented will serve to clarify numerous conditions which appear in practice, the etiology of which is not suspected.

The text sequence is not systematic throughout but this is a minor fault. The book is uniform in value and shows the thorough familiarity of the author with his subject.

The first impression made by this, the second edition of Marion's text book[2] is its delightful orderliness. With plenty of room in his two volumes, the author has set down in well

[1] The Eye. By C. W. Rutherford, M.D., F.A.C.S. 8vo, cloth. Pp. 405, 305 black and white figures and 12 in color. N. Y., D. Appleton & Co., 1928.

[2] Clinical Medicine. By Oscar W. Bethea, M.D., PH.G., F.A.C.P. 8vo, cloth. Pp. 700. Phila., W. B. Saunders Co., 1928.

[1] The Nose, Throat and Ear. By John F. Barnhill, M.D., F.A.C.S. 8vo, cloth. Pp. 604, 456 illus. N. Y., D. Appleton & Co., 1928.

[2] Traité d'Urologie. By G. Marion. Ed. 2. 8vo, cloth. Pp. 1212, 513 illus. Paris, Masson & Co., 1928.

balanced detail the theory and practice of French urologists. The work opens with pages and illustrations devoted to anatomy. Then follow pages devoted to the exploration of the urinary tract, beginning with the urethra and ending with the culture of the gonococcus, and beautifully illustrated by plates taken from the Cystoscopic Atlas of Marion and Geitz-Boyer. After this come pages devoted to symptoms and then the real business begins with diseases of the kidney and kidney pelvis and so on down, including the diseases of the penis, but excluding any formal discussion of those of the seminal vesicles, the epididymes or the testicles.

The eye is immediately held by the number and excellence of the illustrations of which thirty-one are plates in color and four hundred and eighty two illustrations in text.

The cystoscopic plates are a trifle confusing until one realizes that they are drawn from the old-fashioned cystoscope without correction of the image. Thus right is left and left is right. One wonders whether such incorrected cystoscopes are still in current use by French urologists.

The pathological point of view expressed in these volumes is not at all that of the American mind. The author seems to multiply his types of pathological lesions quite unnecessarily. The pathology of renal tuberculosis is classified as follows: (1) Localized granulomata, (2) diffused granulomata, (3) nodular form, (4) pyelitic form, (5) ulcerocaseous pyelonephritic form, (6) radiating form, (7) hydronephrotic form, (8) pyonephritic form, (9) cheesy kidney, (10) atrophic kidney, (11) cystic forms.

The pathology of tumors is confusing. The suprarenal origin of the so-called hypernephroma is accepted. The renal tumors are divided into epithelioma, (a) tubular, (b) papillary, (c) carcinoid, (d) hypernephromata; sarcomas and mixed tumors. The tumors of the bladder are described as polyps subdivided as papillomas, epitheliomas, adenomas and myxomas.

One is surprised to find the senile enlargement of the prostate classified as a tumor, though its inflammatory or congestive origin is plainly enough set down.

In the diagnosis of disease, one feels a slight remoteness between the text and current practice. In many parts of the volume one feels a certain clinging to old-fashioned methods of examination which we no longer employ. Mention is made of modern methods of examination but with a certain vagueness. The symptomatic or clinical diagnostic items are set down with great precision. Two pages are devoted to the cystoscopic diagnosis of bladder tumors, but in his two-line mention of cystography for tumor, Marion has no comment upon the misleading fact that an infiltrating tumor scarcely shows at all by cystogram.

Our greatest interest naturally attaches itself to the therapeutic features of the work, and there is one section of the book which is a most illuminating commentary upon the fact that even the day-to-day local therapeutics of urologists are tending to become much the same the world over.

One wonders how may patients with chronic pyelonephritis follow this method of life:

> (1) Lacto-vegetarian diet. Meat is permitted progressively as the patient's condition improves. If an acute attack occurs, the liquid diet is resumed. (2) Every morning at least half an hour before rising, two tumblers of Contrexeville of Vittel water. (3) Internal antiseptics every other day: for periods of ten days with intervals of five, two capsules a day of Haarlem oil. (4) From time to time turpentine rubs of dry cups to the loins. (5) Rest as complete as possible. (6) Care of the bowels. (7) Every year a cure at Capvern, La Preste, Evian, Vittel au Contrexeville. (8) Vaccines or bacteriophage.

Now let us turn to the surgical practice of a man whom we know to be a good surgeon. Marion employs the straight oblique lumbar incision beginning at the costo-muscular angle. In performing nephrectomy he divides the ureter by the thermo cautery. He does not remove any long section of the tuberculous ureter; but controls the vascular pedicle by a single ligature without the use of any clamps. He states that it is entirely useless to tie these vessels separately, they need only to be cut at a distance sufficiently far from the ligature.

In operating for tumor, he begins by resection of the twelfth rib and extends his incision very far forward. He properly advises that the glands about the pedicle should be removed. In performing a difficult nephrectomy he has no objection to leaving a clamp on the pedicle which shall be removed on the fifth day. For nephropexy he decapsulates all but the lower pole, leaving this in a cup of capsule.

In operating upon the upper ureter, he does not, however, mention the muscle splitting operation which is so convenient to reach the ureter at the pelvic brim. For the lower ureter, he uses an oblique incision parallel to the groin.

For ureteral cystoneostomy he follows Richard's method of splitting the end of the ureter and turning back a cuff so that that portion of the duct which lies within the bladder shall be completely covered by mucosa.

He makes intestinal anastomosis of the ureter an extraperitonial procedure by marsupializing the sigmoid.

One is surprised to find that the operation for tumors of the bladder, as described and depicted in the illustrations, takes no great account of their malignancy. Pedunculated tumors are simply cut away with ligature to the base. For the treatment of exstrophy of the bladder he prefers the operation of Paul Segond.

The operation for vesico-vaginal or vesico-rectal fistula is described in much the same manner as has been described by Young.

In short, these volumes are full of suggestions and in the main are evidently a real reflection of the practice of an accomplished surgeon who knows his anatomy and leaves his micropathology to the laboratory where it belongs.

Treatises on the technique of surgical procedures are notoriously labile. This is especially true in relation to that branch of general surgery known as orthopedics or orthopedic surgery, the borders of which constitute a "no man's land" whose mastery must be determined by the slow attrition of contending experiences.

Such books may at times be commended as much for what is eliminated from the subject matter as for what new material may be included. The volume under review[1] here fulfils these expectations to a remarkable degree.

While the title of this book is the technique of orthopedic intervention, its emphasis is placed nevertheless on the technique of open operations. In this sense it might be considered a complementary volume to Gocht and Debrunner's "Orthopädische Therapie" which more fully covers the ground of what may be termed conservative orthopedics.

The illustrations are numerous and exceedingly well done. There is an equitable sense of proportion in the distribution of priority in surgical procedures. The operations associated with the names of Whitman, Hibbs, Albee and Campbell are adequately covered. It is curious to note that despite the usual thoroughgoing exactness of the Germans, the dean of American orthopedic surgery lives in their literature as Whitman.

The book is to be highly recommended to students and practitioners of orthopedic surgery.

[1] Die Technik des Orthopädischen Eingriffs. By Philip J. Erlacher, M.D. 8vo. Pp. 492, 331 illus. Wien, Julius Springer, 1928.

The first edition of Diagnostik mit freiem Auge (Ektoskopie)[1] appeared in 1923 followed by further observations in 1925, and a much more comprehensive edition in 1928.

The author has designated his method "Ektoskopie," and stresses throughout his work the necessity of diagnosis by inspection. While he does not underestimate the value of the laboratory in diagnosis he feels that both the eye and the mind may be trained to detect obscure pathological conditions by inspection. His knowledge, covering experimental work along these lines for twenty-eight years, has grown to include, in addition to more patent states, diagnosis by "Ektoskopie" of baffling conditions of the splenic and hepatic lobules, and determination of the presence of pleural exudate.

In twenty-eight chapters he discusses not only his technique, but the finer points of his method and its application in tuberculosis, in diseases of the nervous system, in the fields of laryngology and gynecology; and also its results in surgery.

The remaining four chapters are devoted to a concise summary and conclusions in addition to a résumé of the literature in this field.

The study of this book should give a new impetus to the development of the powers of observation with the result that our knowledge of the human body will be increased.

[1] Diagnostik mit freiem Auge (Ektoskopie). By Eduard Weisz, M.D., Pistyan. Ed. 3, enlarged, 8vo. Paper. Pp. xi + 184, Wien, Urban & Schwarzenberg, 1928.

BOOKS RECEIVED

All books received by The American Journal of Surgery are listed in this column as soon as possible after their receipt and this must be considered as adequate acknowledgment. Books that the Editor considers of special interest to our readers will be reviewed in a later issue.

Diseases of the Gall Bladder and Bile Ducts By E. A. Ambrose, M.D., W. H. Cole, M.D., G. H. Copher, M.D., and S. Moore, M,D., 8vo, cloth. Pp. 477, 232 illus. (8 colored). Phila., Lea & Febiger, 1928.

An Introduction to Experimental Pharmocology, By T. Sollman, M.D., and P. J. Hanzlik, M.D. 8vo. cloth. Pp. 321, illus. Phila., W. B. Saunders Co., 1928.

Nachbehandlung nach Chirugischen Eingriffen. By Eduard Melchior, M.D. 8vo, paper. Pp. 347, 32 illus. Leipz., Johann Ambrosius Barth, 1928.

Nasenplastik und Sonstige Gesichtsplastik. Nebsteinem Anhang uber Mammaplastik. Ein Atlas und Lehrbuch. Ed. 1. By J. Joseph, M.D. 8vo, paper. Pp. 239. Leipz., Curt Kabitsch, 1928.

The Newer Knowledge of Bacteriology and Immunology. E. O. Jordan and I. S. Falk, Editors. 8vo, cloth. Pp. 1206, illus. Chicago, Univ. of Chicago Press, 1928.

Preventive Medicine. By M. F. Boyd, M.D. Ed. 3. Revised. 8vo, cloth. Pp. 475, 151 illus. Phila., W. B. Saunders Co., 1928.

Recent Advances in Chemistry in Relation to Medical Practice. By W. McKim Marriott, M.D. 8vo, cloth. Pp. 141, 12 illus. St. Louis, C. V. Mosby Co., 1928.

Röntgentherapie, Band III: Lehrbuch der Röntgenkunde. By Hermann Reider and Josef Rosenthal. 8vo, paper. Pp. 865, 161 illus., 2 tables. Leipzig, J. A. Barth, 1928.

Surgical Anatomy. By G. Massie, M.S. (Lond.), F.R.C.S (Eng.). 8vo, cloth. Pp. 421, 121 illus. Phila., Lea & Febiger, 1928.

Surgical Note-taking. By Charles F. M. Saint, M.D. 8vo, paper. Pp. 80. London, Lewis & Co., 1928.

Surgical Clinics of North America. Vol. VIII, Nos. 2 & 3. Phila., W. B. Saunders, 1928.

La Sympathique et les Systemes Associes. By A. C. Guillaume. 8vo, paper. Pp. 562. Paris, Masson & Cie, 1928.

La Syphilis Medullaire. By Lortat-Jacob. 8vo, paper. Pp. 147. Paris, Masson & Cie, 1928.

Die Technik des Orthopadischen Eingriffs. By Philipp J. Erlacher, M.D. 8vo, paper. Pp. 492, 331 illus. Wien, Julius Springer, 1928.

La Transfusion du Sang de L'Animal a L'Homme. By Rene Cruchet, A. Rago and J. Caussimon. 8vo, paper. Pp. 106. Paris, Masson & Cie, 1928.

Les Tumeurs Villeuses de Rectum. By André Lambling. 8vo, paper. Pp. 120. Paris, Massen et Cie, Editeurs, 1928.

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